



UNIVERZITET CRNE GORE MAŠINSKI FAKULTET PODGORICA



81000 Podgorica, Džordža Vašingtona bb, Žiro račun broj: 510-154-63, tel: +382 20 245 003,

Web : www.ucg.ac.me/mf, Mail: mf@ucg.ac.me

Broj: 198

Podgorica, 28.01.2021.godine

UNIVERZITET CRNE GORE
Odbor za doktorske studije

Poštovani,

U prilogu dopisa Vam dostavljamo Prijedlog odluke o određivanju mentora doktorandu mr Borisu Hrnčiću, koji je upisao doktorske studije u studijskoj 2020/2021. godini, a koji je usvojilo Vijeće Mašinskog fakulteta u Podgorici, na sjednici održanoj elektronskim putem, 27.01.2021. godine,

U prilogu dostavljamo prateću dokumentaciju.

S poštovanjem,


DEKAN

Prof. dr. Igor Vušanović



UNIVERZITET CRNE GORE MAŠINSKI FAKULTET PODGORICA



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Web : www.ucg.ac.me/mf, Mail: mf@ucg.ac.me

Broj: 199
Podgorica, 28.01.2021

Na osnovu člana 64 Statuta Univerziteta Crne Gore, člana 29 Pravila doktorskih studija Univerziteta Crne Gore i prijedloga Komisije za doktorske studije, Vijeće Mašinskog fakulteta, na sjednici održanoj 28.01.2021. godine, elektronskim putem, usvojilo je prijedlog

ODLUKE

o određivanju mentora doktorandu koji je upisao studije 2020/2021 godine

I Kandidatu mr Borisu Hrnčiću predlaže se kao mentor prof. dr Igor Vušanović, naučna oblast Prenos toplote i mase, Numerički prenos toplote, i dodatni mentor (komentor) dr Vedran Perić, Head of Research Center, naučna oblast Dinamička stabilnost, kontrola i upravljanje pametnim mrežama, Integracija električnih sistema obnovljivih izvora energije sa sistemima daljinskog grijanja i hlađenja.

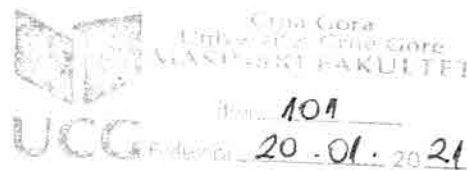
II Kandidat mr Boris Hrnčić je upisao doktorske studije studije 2020/2021 godine na Mašinskom fakultetu.

III Odluka će stupiti na snagu kad je usvoji Senat Univerziteta Crne Gore.

DEKAN,

Prof. dr Igor Vušanović

UNIVERZITET CRNE GORE
Mašinski fakultet
Komisija za doktorske studije
Podgorica, 20.01.2021.



-VIJEĆU MAŠINSKOG FAKULTETA-

U skladu sa Pravilima doktorskih studija u prilogu dostavljamo Obrazac M i prateću dokumentaciju, za potrebe određivanja mentora doktorandu Borisu Hrnčiću koji je upisao studije 2020/21 godine.

Komisija za doktorske studije je na elektronskoj sjednici održanoj 20. 01. 2021. razmatrala dostavljeni obrazac/predlog, i nakon konsultacija, uzevši u obzir želje kandidata kao i naučnu oblast i reference potencijalnih mentora, utvrdila sledeći predlog:

KANDIDAT	MENTOR	DODATNI MENTOR (KOMENTOR)
Boris Hrnčić	Prof. dr Igor Vušanović (oblasti: Prenos toplote i mase; Numerički prenos toplote)	Dr Vedran Perić, Head of Research Center (oblasti: Dinamička stabilnost, kontrola i upravljanje pametnim mrežama; Integracija električnih sistema obnovljivih izvora energije sa sistemima daljinskog grijanja i hlađenja)

Komisija je konstatovala da je dostavljeni material u skladu sa svim normama definisanim u Pravilima doktorskih studija, pa **predlaže Vijeću Mašinskog fakulteta da usvoji inicijalni predlog Komisije i isti dostavi Odboru za doktorske studije UCG na dalje postupanje.**

Srdačno,

Za Komisija za doktorske studije

Prof. dr Aleksandar Vujović

12.01.2021.

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UNIVERZITET CRNE GORE

Mašinski fakultet, Podgorica

Komisiji za Doktorske studije na Mašinskom fakultetu

N/r predsjedniku Komisije prof. dr Aleksandru Vujoviću

Predmet: Zahtjev za određivanje mentora na doktorskim studijama

Poštovani,

U skladu sa članom 29 Pravila doktorskih studija Univerziteta Crne Gore, obraćam Vam se sa ovim zahtjevom kako biste mi odredili mentora i komentora na doktorskim studijama. Za mentora predlažem prof. dr Igora Vušanovića sa Mašinskog fakulteta Univerziteta Crne Gore, a za komentora predlažem dr Vedrana Perića iz Istraživačkog Centra za Kombinovane Pametne Energetske Sistema Tehničkog Univerziteta u Minhenu.

Prilozi:

- Obrazac M
- Obrazloženje potrebe za angažovanjem komentora
- Biografija sa bibliografijom prof. dr Igora Vušanovića
- Odluka o izboru u zvanje prof. dr Igora Vušanovića
- Biografija dr Vedrana Perića
- Bibliografija dr Vedrana Perića

U Podgorici, 12.01.2021.

S poštovanjem



Mr Boris Hrnčić

MENTORSTVO

Kandidat: Ime i prezime	Mr Boris Hrnčić		
PREDLOŽENI MENTOR/I			
	Titula, ime i prezime	Ustanova i država	Naučna oblast
Prvi mentor	Prof. dr Igor Vušanović	Univerzitet Crne Gore Mašinski fakultet Crna Gora	Prenos toplote i mase; Numerički prenos toplote
Drugi mentor	Dr Vedran Perić, Head of Research Center	Tehnički Univerzitet u Minhenu – Istraživački Centar za Kombinovane Pametne Energetske Sisteme	Dinamička stabilnost, kontrola i upravljanje pametnim mrežama; Integracija električnih sistema obnovljivih izvora energije sa sistemima daljinskog grijanja i hlađenja
Sjednica Vijeća organizacione jedinice na kojoj je izvršeno predlaganje mentora			
KOMPETENCIJE MENTORA (pet objavljenih radova u relevantnim časopisima)			
Prvi mentor	1 E. Tombarević, V.R. Voller, <u>I. Vušanović</u>, "Detailed CVFEM Algorithm for Three Dimensional Advection-diffusion Problems ", (2013), Computer Modeling in Engineering and Science CMES, Vol. 96, no.1, pp. 1 – 29. 2 E. Tombarević, <u>I. Vušanović</u>, "Modeling of ice-water phase change in horizontal annulus using modified enthalpy method", (2011), Advances in Applied Mathematics and Mechanics, Vol. 3, No 3, pp. 354 – 369. 3 <u>I. Vušanović</u>, V. R. Voller, "Best practice for measuring grid convergence in numerical models of alloy solidification", International Journal of Numerical Methods for Heat and Fluid Flow, Vol. 26 No. 2, (2016) pp. 427-439 4 V. R. Voller, <u>I. Vušanović</u> "Frequency Analysis of Macrosegregation Measurements and Simulations", International Journal of Heat and Mass Transfer 79 (2014) 468–471. 5 <u>I. Vušanović</u>, M. J. M. Krane, "Microsegregation during solidification of Al-Cu-Mg alloys with varying composition", (2002), International Communications in Heat and Mass Transfer, Vol. 29, No 1, (2002), pp. 1037-1046.		

Drugi mentor	1	T. Kamal. M. Karabacak, <u>V.S. Perić</u> , S.Z. Hassan, L.M. Fernández-Ramírez, L, "Novel Improved Adaptive Neuro-Fuzzy Control of Inverter and Supervisory Energy Management System of a Microgrid" , Energies 2020, 13(18), 4721.		
	2	Luan F.S. Colombari, Roman Kuiava, <u>Vedran S. Perić</u> , Rodrigo A. Ramos, "Continuation Load Flow Considering Discontinuous Behaviors of Distribution Grids". IEEE Transactions on Power Systems, vol. 34 , no.5 , Sept. 2019.		
	3	Tetiana Bogodorova, Luigi Vanfetti, <u>Vedran S. Perić</u> , Konstantin Turitsyn, "Identifying Uncertainty Distributions and Confidence Regions of Power Plant Parameters", in IEEE Access, vol. 5, pp. 19213-19224, 2017.		
	4	<u>Vedran S. Perić</u> , Xavier Bombois and Luigi Vanfretti, "Optimal Signal Selection for Power System Ambient Mode Estimation using a Prediction Error Criterion", IEEE Transactions on Power Systems, vol.31, no.4, pp.2621-2633, July 2016.		
	5	<u>Vedran S. Perić</u> and Luigi Vanfretti, "Power System Ambient Mode Estimation Considering Spectral Load Properties", IEEE Transactions on Power Systems, vol.29, no.3, pp.1133-1143, May 2014.		
PODACI O MAGISTRANDIMA I DOKTORANDIMA				
	Broj magistranada		Broj doktoranada	
	trenutno	ukupno	trenutno	ukupno
Prvi mentor	1	6	2	3
Drugi mentor	4	6	1	1
Datum i ovjera (pečat i potpis odgovorne osobe)				
U Podgorici, 12.01.2021. god.				
MP			DEKAN	

UNIVERZITET CRNE GORE

Mašinski fakultet, Podgorica

Komisiji za Doktorske studije na Mašinskom fakultetu

N/r predsjednika Komisija

prof. dr Aleksandar Vujović

Predmet: Obrazloženje potrebe angažovanja Komentora

Tokom školske studijske 2020/21 godine kandidat Boris Hrnčić, br. indeksa 1/20 u dogovoru sa mentorom, Prof. dr Igorom Vušanovićem dogovorio je da radi doktorsku disertaciju koja povezuje dvije multidisciplinarne oblasti: Energetska efikasnost i Integracija obnovljivih izvora energije u energetske sisteme. Ovom prilikom obavljen je razgovor sa kandidatom i predložen je sledeći radni naslov disertacije:

Radni naslov teme:

**MATEMATIČKO MODELIRANJE I VIŠEKRITERIJUMSKA
OPTIMIZACIJA TOPLOTNE DINAMIKE U SEKTORU
ZGRADARSTVA U CRNOJ GORI**

Tema je zasnovana na problematici dinamike prelaza toplote u zgradama i ispitivanju njenog uticaja na ukupnu potrošnju toplotne, rashladne i električne energije, kao i na mogućnost integracije obnovljivih izvora energije u sektoru zgradarstva.

Na osnovu pravila doktorskih studija Univerziteta Crne Gore, moguće je angažovanje jednog komentora, koji bi u ovom slučaju bio iz oblasti elektroenergetike, preciznije dinamičke stabilnosti, kontrole i upravljanja pametnim mrežama, i integracije električnih sistema obnovljivih izvora energije sa sistemima daljinskog grijanja i hlađenja.

Na osnovu višegodišnjeg naučnog iskustva iz pomenutih oblasti, dr Vedran Perić bi kao komentor svojim znanjem mogao značajno da doprinese kvalitetu izrade doktorske disertacije na navedenu temu.

S poštovanjem,

13.01.2021.

Prof. dr Igor Vušanović

Dr Vedran Perić



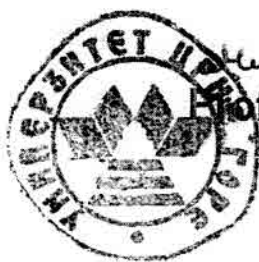
Број: 08-1418
Датум: 27.06.2013 г.

Ref: _____
Date: _____

Na osnovu člana 75 stav 2 Zakona o visokom obrazovanju (Sl.list RCG, br. 60/03 i Sl.list CG, br. 45/10 i 47/11) i člana 18 stav 1 tačka 3 Statuta Univerziteta Crne Gore, Senat Univerziteta Crne Gore, na sjednici održanoj 27.06.2013. godine, donio je

ODLUKU O IZBORU U ZVANJE

Dr IGOR VUŠANOVIĆ bira se u akademsko zvanje **redovni profesor** Univerziteta Crne Gore za predmete: Termodinamika, Energetika u saobraćaju, Kompjuterske metode u energetici i Mjerenje i simulacija energetskih procesa, na Mašinskom fakultetu.

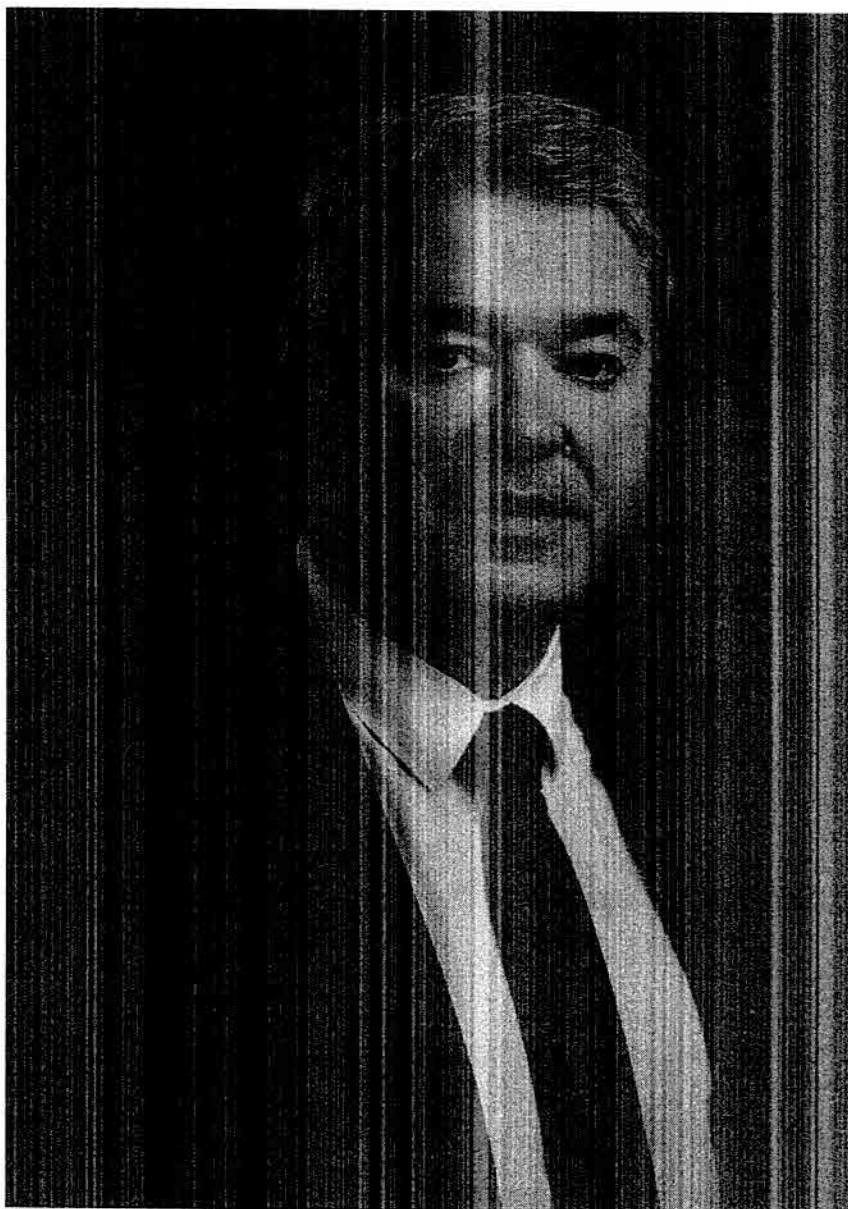


REKTOR

Predrag Miranović
Prof. dr Predrag Miranović

CURRICULUM VITAE

Igor Vušanović



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Education

2002	Ph.D. Degree, Mechanical Engineering, University of Montenegro;
1996	M.S. Degree, Mechanical Engineering, University of Montenegro;
1992	B.S. Mechanical Engineering Degree, University of Belgrade;

Employment

2016 -

Dean of Mechanical Engineering, University of Montenegro

2012 -

Full Professor, University of Montenegro, Faculty of Mechanical Engineering;

2008 - 2012

Associate Professor, University of Montenegro, Faculty of Mechanical Engineering;

2003-2008

Assistant Professor, University of Montenegro, Faculty of Mechanical Engineering;

1996-2002

Assistant (Second Level), University of Montenegro, Faculty of Mechanical Engineering;

1992-1996

Assistant (First Level), University of Montenegro, Faculty of Mechanical Engineering

Honors

Purdue University, School of Materials Engineering, USA, Visiting Scholar, Fellowship of Ministry of Science of Montenegro, 1999

Ministry of Science and Education Scholarship, 1989/90, 1990/91, and 1991/92, (granted to students with high scholastic record)

Grants

University of Belgrade, Best student of generation 1992

Professional Societies

ASHRAE, Associate Member, USA

Research Interests

The main thrust of my research was the mathematical and numerical modeling of different transport phenomena processes. One of the purest examples is solidification of multi-component alloys. Concentration equation is additionally accompanied to the standard set of equations (flow and energy equation) and therefore additional thermodynamic modeling is necessary to get closed set ready to be solved. This additional model is known in literature as microsegregation model and in multicomponent system is usually based on two different sets of equations: generic conservation equations of enthalpy and concentration and comprehensive phase diagram that describes relation between phases that precipitates during the freezing process.

Next research interest is developing of different numerical techniques for solving standard set of transport equations. Recently we developed solution based on CVFEM numerical scheme (**C**ontrol **V**olume **F**inite **E**lement **M**ethod) which was applied in case of geo-thermal modeling of "U" type heat exchangers. Heat pumps as a devices is one of the key global solutions to the path of decarbonization in household and building stock in every city. We are interested to explore possibilities to use the soil as a heat sink and source for

heat pump systems, on sustainable way to preserve existing plants and keeping soil energy balances in both summer and winter season.

Another field that we are interested in our group is dynamic modeling of heat and cooling demands for building stock and household, in order to construct and design so called zero energy buildings (ZEB). Numerical techniques for this comprehensive modeling is based on solving of basic heat transfer equations of heat transfer, using periodic behavior of heat load in buildings and unsteady cooling, and solving of phenomena of heat island in cities.

Next field of interest is energy planning toward the implementation of RES in energy system in Montenegro. We are interested to see behavior of baseload in Montenegro and how this demand can be fitted with different types of renewable energy sources.

In the field of RES we are also interested for modeling of low frequent noise generated with wind turbines. This renewable energy source devices produce noise caused by turbulent flow and can affect leaving creature and birds in near surrounding. Our mission is to build a comprehensive models and have a basic knowledge to response on this important issue in next couple of decades.

Ph.D. Thesis: "Analysis of Phase Change Phenomena in Multicomponent Systems with Aspects of Technical Applying"

M.S. Thesis: "Analysis of ice making and melting processes by using modify "enthalpy method", in ice storage systems"

References

USA

1. Satya N. Atluri, Distinguished Professor, at the Department of Mechanical Engineering at Texas Tech University, Texas, USA.
2. Vaughan R. Voller, Professor, Department of Civil, Environmental and Geo – Engineering University of Minnesota, Minnesota, USA
3. Matthew J. M. Krane, Associate Professor, Materials Engineering, Purdue University, West Lafayette, IN, USA
4. Velimir Radmilović, Professor, National Center for Electron Microscopy, Lawrence Berkeley National Laboratory, Berkeley, CA, USA

SLOVENIA

1. Dr Božidar Šarler, Professor, University of Nova Gorica, Laboratory for Multiphase Processes, Slovenia (<http://www.p-ng.si/en/research/multiphase-processes/>)

SERBIA

1. Dr Dimitrije Voronjec, Professor, Faculty of Mechanical Engineering, University of Belgrade, Belgrade, Yugoslavia
2. Dr Milovan Studović, Professor, Faculty of Mechanical Engineering, University of Belgrade, Belgrade, Yugoslavia

MONTENEGRO

1. Dr Petar Vukoslavčević, Professor, Faculty of Mechanical Engineering, University of Montenegro, Podgorica, Yugoslavia
2. Dr Nenad Kažić, Professor, Faculty of Mechanical Engineering, University of Montenegro, Podgorica, Yugoslavia

Research Activity

Over the past 27 years, I have conducted studies about:

- Modeling of two-phase flow (water-steam) in evaporator channels with couple of different mathematical models,
- Phase change phenomena in ice water system using modify "enthalpy" method for describing energy balance equation,
- Phase change phenomena during the solidification of two and three component alloys with special attention on Al-Cu-Mg alloy,
- Modeling of heat transfer in vertical U type heat exchangers,
- Modeling of dynamic behavior toward the zero energy buildings,

During the undergraduate study and for graduate work I have developed different mathematical models for predicting heat and mass transfer in evaporator channels. The most simply model treat two phase mixture as homogenous, but it can be successfully used for calculating the pressure drop and temperature profiles in 1-D channels trough the time. Most advanced model of characteristics has been developed also, and it can be successfully used for predicting fast heat and mass transfer processes in evaporator channels. Those phenomena occur in many technical systems (stream generators, heat exchangers, and steam boilers) during the accident, which happens under the undesirable conditions.

During the Master degree study I made efforts to developing mathematical and numerical models for describing phase change phenomena in ice water system. Transport phenomena during the phase change in ice water system are important in many systems of latent energy storage, which is commonly used for energy saving in processes that demand low energy consumption. Mathematical model for describing phase changes phenomena in ice water that's developed treat problem as 2-D unsteady. An energy balance equation is written with enthalpy instead of temperature, and special algorithm is developed for calculating local temperature and fraction of solid and liquid, knowing mixture enthalpy. Isothermal character of phase change phenomena was a main difficulty in order to get temperature and mass fraction of solid phase field from mixture enthalpy, known from governing equations.

During my Ph.D. study, I worked on mathematical and numerical modeling of transport phenomena in ternary Al-Cu-Mg alloy as multi-component system. Macrosegregation i.e. redistribution of alloying elements which occurs in ingot scale is usually induced by a relative movement of both solid and liquid phase during the casting process, and can be successfully described with standard set of transport equations (mass, momentum, energy and concentration). As a constitutive correlation for macroscopic set of equations, generic ternary phase diagram of ternary Al-Cu-Mg alloy and appropriate microsegregation model has been implemented. This microscopic model was used to compute local temper-

atures, solid and liquid fractions and compositions of both alloying elements. The different sets of equations were used for primary and subsequent solidifications. The non-equilibrium in primary phase is enforced as well as diffusion that is modeled 1-D planar model. Compositional profiles of Cu and Mg in primary, secondary and ternary phase can be calculated with represented model, as well as ratio between phases and diffusion of Cu and Mg in primary phase.

After finishing of my Ph.D. dissertation the main research is focused on experimental validation of macro and micro modeling of ternary Al alloys. Experimental installation is composed from metal mold, electrical heaters and water-cooled heat exchanger for heat removal during the casting. Temperature measurements have been performed at the all six sides of mold, while the measurements inside the mold are taken too. Aluminum based *Al-4wt%Cu-1wt%Mg* alloy was cast couple of times and temperature and compositional measurements have been cut and compared with predicted values. Also, alloy *Al-32wt%Cu-2wt%Mg* is also cast with similar conditions as previous mentioned. The purpose of those experiments is to evaluate model that was developed during my PhD study. Some of these results have been published at EURO THERM 69 Conference, held in Slovenia 2003.

During the period 2004 – 2008 I participated in two separate projects in the frame of scientific cooperation with Slovenian institutions (University of Nova Gorica), and we successfully worked on developing of microsegregation codes for ternary commercial alloys (Al-Cu-Mg, Al-Mg-Si, Al-Fe-Si) which are of interest of company IMPOL d.d (www.impol.si) from Slovenska Bistrica. The all developed codes were successfully implemented in well known macroscopic mixture models and codes for vertical (VDC) and horizontal (HDC) casting of ternary aluminum alloys.

Teaching Experience

At the Faculty of Mechanical Engineering and Faculty of Metallurgy and Technology at University of Montenegro I have taught as an Assistant the following graduate courses:

- Thermodynamics
- Refrigeration systems,
- Steam Boilers,
- Heating and Ventilation,
- Fluid Mechanics.

After finishing my Ph.D. work after I was promoted in Assistant Professor I started teach two new established courses:

- Numerical Heat Transfer and Fluid Flow;
- Measuring and Simulations of Energy Processes;

These courses were performed for a first time at the Faculty of Mechanical Engineering in school year 2003/2004.

After 2006 I started teach

- Air conditioning at the Faculty of Mechanical Engineering;
- Thermodynamics at Maritime faculty in Kotor.

Igor Vušanović - Publications

A. Paper published or submitted for publishing in international review journals

1. J. Coleman, M. Krane, I. Vušanović, "Investigation of grain suspension in horizontal direct chill casting", *submitted to Materials Science and Technology*, Nov. 2020.
2. I. Vušanović, V. R. Voller, "Reduced Complexity Solidification Models", *accepted for publishing in Int. Journal of Heat and Mass Transfer*, Dec. 2020.
3. Pireci, M., Vušanović, I., Analysis of the use of different standards for estimation of energy efficiency measures in the building sector, *J. sustain. dev. energy water environ. syst. – JSDEWES*, 1080375, DOI: <https://doi.org/10.13044/j.sdewes.d8.0375>
4. B. Hrnčić, A. Pfeifer, V. Ivanović, I. Vušanović, "Energy transition towards achieving a 100% renewable energy system: Case study of Montenegro", *to be submitted to Energy & Environment*, 2021.
5. E. Tombarević, I. Vušanović, "Numerical Analysis of Unsteady Heat Transfer in U-tube Geothermal Heat Exchanger", *ANNALS of Faculty Engineering Hudenora – International Journal of Engineering*, Vol. 16(2), (2018) pp. 141-144. (ISSN 1584-2665)
6. I. Vušanović, V. R. Voller, "Best practice for measuring grid convergence in numerical models of alloy solidification", *International Journal of Numerical Methods for Heat and Fluid Flow*, Vol. 26 No. 2, (2016) pp. 427-439
7. I. Vušanović, V. R. Voller, "Simple metrics for verification and validation of macrosegregation model predictions", *IOP Conference Series: Materials Science and Engineering* **117** (2016) 012062, doi:10.1088/1757-899X/117/1/012062.
8. I. Vušanović, "Transient permeability in macrosegregation of static casting in binary alloys: Use of CDF statistical model for analysis", *IOP Conference Series: Materials Science and Engineering* **84** (2015) 012008.
9. V. R. Voller, I. Vušanović "Frequency Analysis of Macrosegregation Measurements and Simulations", *International Journal of Heat and Mass Transfer* **79** (2014) 468-471.
10. I. Vušanović, V. R. Voller, "Understanding channel segregates in numerical models of alloy solidification: A case of converge first and ask questions later", *Materials Science Forum*, Vols. 790-791, pp. 73-78, (2014), Trans Tech Publications, Switzerland (doi:10.4028/www.scientific.net/MSF.790-791.732013).
11. E. Tombarević, V. R. Voller, I. Vušanović, "Detailed CVFEM Algorithm for Three Dimensional Advection-diffusion Problems", (2013), *Computer Modeling in Engineering and Science CMES*, Vol. 96, no.1, pp. 1 – 29.
12. B. Šarler, R. Vertnik, A. Z. Lorbiecka, I. Vušanović, B. Senčič, Application of continuous casting simulation at Štore Steel, II. *BHM Berg Huetttenmaennische Monatshefte*, (2013), str. 1-9, doi: 10.1007/s0050101301477.
13. I. Vušanović, R. Vertnik, B. Šarler, "A simple slice model for prediction of macrosegregation in continuously cast billets", *IOP Conference Series - Materials Science and Engineering* **27** (2012) 012056, DOI: 10.1088/1757-899X/27/1/012056.
14. B. Šarler, R. Vertnik, A. Z. Lorbiecka, I. Vušanović, B. Senčič, "A multiscale slice model for continuous casting of steel", *IOP Conference Series: Materials Science and Engineering* **33** (2012) 012021.
15. J. D. Jovanović, E. M. Tombarević, I. C. Vušanović, "Control volume finite element method for modeling of spur gear frictional heat", (2013), *Technics Technologies Education Management – TTEM*, Vol. 8, No 2. 5/6.

16. I. Vušanović, M. J. M. Krane, "Macroseggregation in horizontal direct chill casting of ternary Al alloys: Investigation of solid motion", *IOP Conference Series: Materials Science and Engineering* **27** (2012) 012069.
17. E. Tombarević, I. Vušanović, "Modeling of ice-water phase change in horizontal annulus using modified enthalpy method", (2011), *Advances in Applied Mathematics and Mechanics*, Vol. 3, No 3, pp. 354 – 369.
18. I. Vušanović, "Macroseggregation of ternary Al – 4.5Cu – 1.0Mg alloy in horizontal direct chill casting: implementation of non-equilibrium microseggregation model", (2009), *International Journal of Cast Metal Research*, Vol. 22, No 1 – 4, pp. 314 – 317.
19. M. J. M. Krane, I. Vušanović "Macroseggregation in horizontal direct chill casting of aluminum slabs", (2009), *Materials Science & Technology*, Vol. 25, No. 1, pp. 102 – 107.
20. I. Vušanović, B. Šarler, M.J.M. Krane, "Microseggregation during the solidification of an Al-Mg-Si alloy in the presence of back diffusion and macroseggregation", (2005), *Materials Science Engineering (A)*, Vol. 413 – 414, pp. 217 – 222.
21. A. Bergant, U. Karadžić, J. Vitkovsky, I. Vušanović, A. R. Simpson, "A Discrete Gas-Cavity Model that Considers the Frictional Effects of Unsteady Pipe Flow", (2005), *Strojniški vestnik – Journal of Mechanical Engineering*, Vol. 51(11), pp. 692 – 710.
22. I. Vušanović, M. J. M. Krane, "Microseggregation during solidification of Al-Cu-Mg alloys with varying composition", (2002), *International Communications in Heat and Mass Transfer*, Vol. 29, No 1, (2002), pp. 1037-1046.
23. I. Vušanović, D. Voronjec, M.J.M. Krane, "Microseggregation phenomena in Al-Cu-Mg alloy with considering of diffusion phenomena in primary phase" *Facta Universitatis*, Vol. 1, No 8, (2001), pp. 965 - 980.
24. V. Asanovic, B. Perovic, Z. Markovic, I. Vušanović, A. Kostov, "The influence of heat treatment on shape memory effect, *Materials Science Forum*, Vol. 352. (2000) pp. 165-170.
25. V. Asanović, B. Perović, Z. Marković-Leka, A. Kostov, I. Vušanović, "Thermoelastic Martensitic Transformation and Shape Memory Effect in Cu-Zn-Al Alloys," *Acta periodica technologica*, Vol. 31, (2000), Issue B, pp. 515-523.

B. Papers published in national Yugoslav journals (in Serbian; abstract in English)

1. M. Šekularac, I. Vušanović, "Dinamika sistema toplotne pumpe sa klima – komorom u rashladnom režimu rada", *KGH*, No. 3/2008, pp. 27 – 44, (2008).
2. I. Vušanović, M.J.M. Krane, "Matematički model mikrosegregacije u Al-Cu-Mg leguri sa promjenljivim koncentracijama tokom očvršćavanja", *Termotehnika*, No. 1-4 Vol. 27 (2001), pp. 25-36.
3. V. Asanovic, B. Perovic, Z. Markovic, I. Vušanović, A. Kostov, "The influence of heat treatment on shape memory effect, *Journal of Technique*, No. 3/1999, Belgrade, 1999.
4. I. Vušanović, "Numerical modeling of phase change phenomena in ice – water system by using modify enthalpy method", *Thermal Science – Journal of Heat Transfer Engineers*, No. 1-4/1998, Belgrade, 1998.
5. I. Vušanović, "Mathematical modeling of phase change phenomena in two component system, based on enthalpy approach", *Journal - Process Technique*, No. 2-3/1998, Belgrade, 1998.
6. N. Kazic, I. Vušanović, "The Phenomena of ice making process in ice storage systems", *KGH*, No. 2/1995, Belgrade, 1995.

C. Papers published in the proceedings or international conferences (in English)

1. I. Vušanović, V.R. Voller, "Computations of steady state alloy solidification in a cavity", *6th International Conference on Computational Methods for Thermal Problems, THERMACOMP2020*, N. Massarotti, P. Nithiarasu, and I. Vušanović (Eds.), Budva, Montenegro, Septembar 2021.
2. B. Hrnčić, A. Pfeifer, V. Ivanović, I. Vušanović, "Energy transition towards achieving a 100% renewable energy system: Case study of Montenegro", *4th SEE SDEWES conference*, Sarajevo, Bosnia & Herzegovina, June 2020.
3. M. Pireci, I. Vušanović, V. Ivanović "Analysis of use of different standards for estimations of energy efficiency measures in building sector, *4th SEE SDEWES conference*, Sarajevo, Bosnia & Herzegovina, June 2020.
4. J. Coleman, I. Vušanović, and M. J. M. Krane, "Characterization of the 3D Flow Field and Macroseggregation in Horizontal Direct Chill Cast Slabs", *5th International Conference on Advances in Solidification Processes – ICASP5*, Salzburg, Austria, June 2019.
5. M. Đekić, E. Tombarević and I. Vušanović, "Long term performance of building with vertical ground coupled heat pump system, *In P. Gvero (Ed.) Book of Abstracts of the 14th International Conference on Accomplishments in Mechanical and Industrial Engineering DEMI*, May 24 – 25th, 2019, Banja Luka, Bosnia and Herzegovina.
6. I. Vušanović, VR Voller, "Numerical Modeling of Solid Movement in Phase Change Processes", *ICCES: International Conference on Computational & Experimental Engineering and Sciences*, March 25 – 28th, 2019, Tokyo, Japan.
7. E. Tombarević, I. Vušanović "Experimental validation of a quasy-3D CVFEM model of borehole heat exchangers", *Fourth International Conference on Computational Methods for Thermal Problems, THERMACOMP 2016*, July 6-8, 2016, Georgia Tech, Atlanta, USA, N. Massarotti, P. Nithiarasu and Y. Joshi (Eds.)
8. I. Vušanović, "Transient permeability in macroseggregation of static casting in binary al-loys: Use of CDF statistical model for analysis ", *Modeling of Casting, Welding and Advanced Solidification Processes (MCWASP XV 2015)* Awaji Island, Japan, June 2015.
9. I. Vušanović, V. R. Voller, "Simple metrics for verification and validation of macroseggregation model predictions", *4th International Conference on Advances in Solidification Processes*, Beaumont Estates, Old Windsor, UK, 2014.
10. I. Vušanović, V. R. Voller, "Effect of domain size on grid convergence in numerical models of alloy solidification", *Third International Conference on Computational Methods for Thermal Problems, THERMACOMP 2014*, June2-4, 2014, Lake Bled, Slovenia, (N. Massarotti, P.Nithiarasu and B. Šarler (Eds.)
11. E. Tombarević, I. Vušanović, "Numerical Model of Heat flow in a Geothermal borehole heat exchanger ", *Third International Conference on Computational Methods for Thermal Problems, THERMACOMP 2014*, June2-4, 2014, Lake Bled, Slovenia, (N. Massarotti, P.Nithiarasu and B. Šarler (Eds.)
12. B. Šarler, A. Z. Lorbiecka, U. Hanoglu, R. Vertnik, I. Vušanović, "A meshless slice model for continuous casting and hot rolling of steel. " V: LIU, Gui-Rong (ur.), LIU, Z. S. (ur.). *Proceedings of the 5th Asia Pacific Congress on Computational Mechanics (APCOM2013) and 4th International Symposium on Computational Mechanics (ISCM2013)*, 11th -14th December 2013, Singapore.
13. I. Vušanović, V. R. Voller, "Understanding channel segregates in numerical models of alloy solidification: A case of converge first and ask questions later ", *The 6th International Conference on Solidification and Gravity*, Miskolc Lillafured, Hungary, 2 – 6th September 2013.

14. B. Šarler, R. Vertnik, A. Z. Lorbiecka, U. Hanoglu, I. Vušanović, "An Extended Heat and Mass Transfer Slice Model for Continuous Casting of Steel", *ECCOMAS Special Interest Conference Numerical Heat Transfer*, Gliwice-Wrocław, Poland, 4-6 September 2012. Eds.: A. Nowak, R.A. Bialecki
15. E. Tombarević, I. Vušanović, "Control Volume Finite Element Method for two and three dimensional advection-diffusion problems", *ICCES Special Symposium on Meshless & Other Novel Computational Methods*, Budva, Montenegro, September 2012.
16. B. Šarler, R. Vertnik, A. Z. Lorbiecka, I. Vušanović, B. Senčič, "A multiscale slice model for continuous casting of steel", *Modeling of Casting, Welding and Advanced Solidification Processes (MCWASP XIII 2012)*, Schladming, Austria, June 2012
17. I. Vušanović, R. Vertnik, B. Šarler, "A simple slice model for prediction of macrosegregation in continuously cast billets: influence of different solid diffusion models", *International symposium on liquid metal processing and casting, LMPC*, Nancy, France, September, 2011
18. I. Vušanović, R. Vertnik, B. Šarler, "A simple slice model for prediction of macrosegregation in continuously cast billets", *3rd International Conference on Advances in Solidification Processes*, Rolduc Abbey/Aachen, Germany, June 2011
19. I. Vušanović, M. J. M. Krane, "Macrosegregation in horizontal direct chill casting of ternary Al alloys: Investigation of solid motion", *3rd International Conference on Advances in Solidification Processes*, Rolduc Abbey/Aachen, Germany, June 2011
20. E. Tombarević, I. Vušanović, "3D Numerical model of the borehole heat exchanger", *Slovenian-Italian Conference on Materials and Technologies for Sustainable Growth*, University of Nova Gorica, Ajdovščina, Slovenia, May 2011
21. I. Vušanović, "Energy efficiency in building sector: solutions for heating and air conditioning in Montenegro", *Third International Conference GNP 2010*, Žabljak, Montenegro, 2010.
22. E. Tombarević, I. Vušanović, "Modelling of ice melting in horizontal annulus using enthalpy method", *First International Conference on Computational Methods for Thermal Problems*, ThermaComp 2009, Naples, Italy, 2009.
23. E. Tombarević, I. Vušanović, "Influence of inner pipe wall temperature on freezing of water in a horizontal cylindrical annulus", *EUROTHERM Nr. 84 Thermodynamics of phase change*, Namur, Belgium, 2009.
24. I. Vušanović, "Macrosegregation of ternary Al – 4.5wt%Cu – 1.0wt% Mg alloy in horizontal direct chill casting – implementation of non-equilibrium microsegregation model" *Proceedings of the Second International Conference on Advances in Solidification Processing*, Graz/Seggau, Austria, June 2008.
25. M. Šekularac, I. Vušanović, "Mathematical modeling of HVAC instalations", *Klima Forum 2007*, Godovič, Slovenia, September 2007
26. I. Vušanović, I. Vujošević, "Energy efficiency strategy in Montenegro – implementation and challenges", *Klima Forum 2007*, Godovič, Slovenia, September 2007.
27. I. Vušanović, B. Šarler, "Modeling of micro and macro segregation in DC casting of ternary Al based alloys", *EUROMAT 2007*, Nurnberg, Germany, September 2007.
28. I. Vušanović, M. J. M. Krane, "Macrosegregation in horizontal direct chill casting (HDC) of aluminium binary alloys billets- influence of casting parameters," in *Solidification Processing 07*, H. Jones et al. (eds.), pp 428-432 (2007).
29. I. Vušanović, M.J.M. Krane, "Macrosegregation In Horizontal Direct Chill Casting (HDC) Of Aluminum Alloy Billets – Influence Of Casting Parameters", *Proceedings of the 5th Decennial International Conference on Solidification Processing*, Sheffield, UK, July 2007.

30. U. Karadžić, A. Bergant, I. Vušanović, "Influence of unsteady friction on transients in hydraulic pipeline systems", *12th Symposium on thermal science*, Sokobanja, Serbia, October 2005.
31. N. Kažić, I. Vušanović, "Exergy and HVAC", *Klima forum 2006*, Godovič, Slovenia, September 2006.
32. Šarler, B., Kovačević, I., Vertnik, R., Hartman, S., Vušanović, I., Založnik, M., Šafhalter, R., Slaček, E., Dragojevič, V., Jelen, M., Strnad, V., Robič, A. : Integrated numerical simulation approach in IMPOL aluminium industry casthouse, *International Conference on Aluminium in conjunction with the 6th World Trade Fair*, Essen, Germany, September, 2006.
33. I. Vušanović, B. Šarler, M.J.M. Krane, "Microsegregation during the solidification of an Al-Mg-Si alloy in the presence of back diffusion and macrosegregation", *International Conference on Advances in Solidification Processes*, Stockholm, Sweden, 2005.
34. I. Vušanović, M.J.M. Krane, "Mathematical model for microsegregation of Al rich Al-Cu-Mg alloys with considering of diffusion in primary phase", *II International Symposium LIGHT METALS AND COMPOSITE MATERIALS*, Belgrade, Serbia & Montenegro, 2004.
35. I. Vušanović, M.J.M. Krane, "Numerical and Experimental study of Macrosegregation During the Casting of Al-Cu-Mg Alloys", *EUROTHERM 69 Heat and Mass Transfer in Solid - Liquid Phase Change Processes*, Ljubljana, Slovenia, 2003.
36. V.D. Asanovic, I. Vušanović, Z.B. Markovic, A. Kostov, B. Bosnjak, B. Radulovic, "The influence of the heat treatment on martensitic transformation and properties of Cu-Zn-Al shape memory alloys", *3rd Macedonian Conference of Metallurgy*, Ohrid, 2000.
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38. V.D. Asanovic, B. Perovic, Z. Markovic, A. Kostov, I. Vušanović, "Thermoelastic martensitic transformation and shape memory effect in Cu-Zn-Al alloys", *YUCFPCE (Yugoslav Congress of food, pharmaceutical and Chemical engineering)*, Novi Sad, 1999.
39. I. Vušanović, "Numerical modeling of phase change in ice-water system by using modify enthalpy method", *10th Symposium YU - TERM '97*, Zlatibor, 1997.
40. I. Vušanović, N. Kažić, "One numerical approach to the process in the ice storage device", *12th International Congress of Chemical and Process Engineering - CHISA '96*, Prague, 1996.
41. I. Vušanović, V. Stevanovic, M. Studovic, "Transferring of waves in evaporator channel with disturbances of intake fluid flow", *24th Congress KGH*, Belgrade, 1993.
42. I. Vušanović, V. Stevanovic, M. Studovic, "Mathematical model of forced and natural circulation - Modular approach", *23rd Congress KGH*, Belgrade, 1992.

D. Papers published in the proceedings of domestic conferences (in Serbian)

1. Karadžić, U., Bergant, A., Vušanović, I. "Validacija konvolucijskog modela nestacionarnog trenja za prelazne procese u hidrauličkim cijevnim sistemima", *30. HIPNEF sa međunarodnim učešćem 24-26 maj*, Vrnjačka Banja, Srbija, 2006.
2. V.D. Asanovic, B. Perovic, Z. Markovic, I. Vušanović, "Aging effect on shape memory in Cu-25.38Zn-3.3Al", *XXXIX Meeting of Serbs Chemical Society*, Belgrade, 1999.
3. V. Asanovic, B. Perovic, Z. Markovic, I. Vušanović, A. Kostov, "The influence of heat treatment on shape memory effect", *YUCOMAT '99*, Herceg Novi, 1999.

4. I. Vušanović, N. Kazic, "Analysis of ice making process with various regimes of work of ice storage and their influence on efficiency of system", *Industrial Energetics '96*, Herceg Novi, 1996.
5. I. Vušanović, "Model simulation of thermohydraulic instabilities in two phase flow", *Symposium "Thermohydraulics '94"*, Belgrade, 1994.
6. N. Kazic, I. Vušanović, "Processes of making and melting of ice in ice storage systems", *Industrial Energy '94*, Belgrade, 1994.
7. I. Vušanović, N. Kazic, "Numerical Modeling of natural convection in Thermal Cavity", *Industrial Energy '94*, Belgrade, 1994.

E. International & National Scientific Projects on which I. Vušanović participated

1. I. Vušanović, "Modeliranje i optimizacija potrošnje energije u rezidencijalnim objektima u realnom vremenu (**MOPEREV**)", Ministarstvo nauke Crne Gore, 2021 – 2022.
2. I. Vušanović, V. R. Voller, M. Valant, E. Tombarević, "Numeričko i eksperimentalno istraživanje mogućnosti korišćenja geotermalne energije za potrebe rada geotermalnih toplotnih pumpi", Ministarstvo nauke Crne Gore, 2012 – 2015.
3. I. Vušanović, B. Šarler, "Modelling of industrial solidification processes under influence of electromagnetic fields", *Financed and supported by Ministry of Science of Montenegro and Ministry of Science, Education and sport of Slovenia, BI – SCG/2014 – 2015*.
4. V. Novaković, M. Vukčević, I. Vušanović, "HERD QIMSEE – Higher Education Research & Development – Quality Improvement in Science, Engineering and Education, Financed by Norwegian Ministry of foreign affairs with NTNU University, Trondheim, 2014 – 2016.
5. I. Vušanović, W. Chen, "Implementation of fast meshless simulations methods on solid mechanics and heat transfer problems in large scale structures", *Financed and supported by Ministry of Science of Montenegro and Ministry of Science of China, in the frame of Montenegrin - Chinese Science & Technology cooperation BI – CHN/2014 – 2016*.
6. I. Vušanović, B. Šarler, "Advanced modeling of continuous casting of steel", *Financed and supported by Ministry of Science of Montenegro and Ministry of Science, Education and sport of Slovenia, BI – SCG/2012 – 2013*.
7. I. Vušanović, B. Šarler, "Multiscale modeling of continuous casting of steel", *Financed and supported by Ministry of Science of Montenegro and Ministry of Science, Education and sport of Slovenia, BI – SCG/2010 – 2011*.
8. I. Vušanović, B. Šarler, "Modeling of micro and macrosegregation of ternary aluminium alloys obtained through DC casting and twinroll casting", *Financed and supported by Ministry of Science of Montenegro and Ministry of Science, Education and sport of Slovenia, BI – SCG/06-07*.
9. I. Vušanović, B. Šarler, "Modeling of phase change phenomena in Al alloys", *Financed and supported by Ministry of Science of Montenegro and Ministry of Science, Education and sport of Slovenia, BI – SCG/04-05*.
10. D. Gobin, B. Šarler, I. Vušanović, "Advances in simulation capabilities for solidification systems", *Programme ECO-NET 2005*.
11. I. Vušanović, "Development of ternary microsegregation models for direct-chill casting and twin-roll strip casting of Al based alloys, *IMPOL d.d., 2004*.
12. I. Vušanović, "Measuring and Simulation of Energetic Processes", *CDP+ Project No. 011 (2) supported and financed by WUS Austria, 2005*.

F. Graduate students supervisions

F.1 Master thesis – Advisor (A) and Committee member (M)

1. Maliq Pireci, "Uparedna analiza proračuna korišćenjem standarda MEST EN ISO 13790 i software-a RETScreen za potrebe analiza energetske efikasnosti objekata", University of Montenegro, Faculty of Mechanical Engineering, December 2019. (A).
2. Marko Đekić, "Energy use analysis of residential building equipped with heat pumps in Montenegro", University of Montenegro, Faculty of Mechanical Engineering, October 2017. (A).
3. Esad Tombarević, "Modelling of phase change in ice storage with horizontal pipe", University of Montenegro, Faculty of Mechanical Engineering, March 2009. (A).
4. Milan Šekularac, "Analysis of dynamic of operation of a HVC system heat pump – air conditioning unit", University of Montenegro, Faculty of Mechanical Engineering, July 2008. (A)
5. Uroš Karadžić, "Analysis fluid transients phenomena in hydraulic systems", University of Montenegro, Faculty of Mechanical Engineering, October 2004. (A)
6. Sanja Radović, "Investigation of controlled cooling in continuous rolling of iron bars", University of Montenegro, Faculty of Metallurgy and Technology, University of Montenegro, December 2004. (M)

F.2 Ph.D thesis – Advisor (A) and Committee member (M)

7. Vidosava Vilotijević, "Numerical simulations and field data analyses of aerodinamical noise generation by wind turbine, PhD thesis, University of Montenegro, Faculty of Mechanical Engineering, in progress.... (A)
8. Esad Tombarević, "Analysis of unsteady heat transfer in the geothermal u-tube bore-hole heat exchangers" PhD thesis, University of Montenegro, Faculty of Mechanical Engineering, July 2016. (A)
9. Uroš Karadžić, "Modelling of complex boundary conditions for transients in hydraulic systems", University of Montenegro, Faculty of Mechanical Engineering, November 2008. (M)

G. Lectures

1. I. Vušanović, "Horizontal direct chill castings of aluminum alloys: challenges and perspectives ", University of Ljubljana, Faculty of Mechanical engineering, September 2019 (invited lecture).
2. I. Vušanović, "Current Challenges in Modeling Solidification Processes", Warren Lecture Series at Department of Civil, Enviromental and Geo – Engineering, University of Minnesota, September 2017 (invited lecture).
3. I. Vušanović, "Modeling issues in transport phenomena with phase change in multi-component systems ", Nanjing University, February 2014 (invited lecture)
4. I. Vušanović, "Micro and Macrosegregation during the DC casting in ternary Al", University Pierre & Marie CURIE, Fast Laboratory, September 2006, (seminar);
5. I. Vušanović, "Micro-macrosegregation in ternary alloys - review of previous work and future challenges", University of Birmingham, School of Engineering, June 2006, (invited lecture);

6. I. Vušanović, "Numerical and experimental modeling of macrosegregation in ternary aluminum alloys, Nova Gorica Polytechnic, March, 2004 (invited lecture)

H. Strategies Expertise on which I. Vušanović participated as an author or co - author (on serbo-croatian)

1. N. Kažić, P. Vukoslavčević, D. Ivanović, I. Vušanović, U. Karadžić, V. Ivanović, E. Tombarević, M. Šekularac, "Elaborat za rješavanje problema zagađenosti u Pljevljima, Centar za Energetiku, Mašinski fakultet UCG, Jun 2015.
2. I. Vušanović, "Crna Gora u XXI stoljeću u eri kompetitivnosti, Podprojekat ENERGIJA, *Crnogorska Akademija Nauka i Umjetnosti (CANU)*, Podgorica, April 2010 (u izradi).
3. H. Birkeland, K. O. Nerland, V. Rodić Igor Vušanović, "Montenegro - Prestudy Energy Efficiency and Renewable Energy Agency in Montenegro", *NORSK ENERGY*, Project No. 04 - 28499, April 2008.
4. I. Vujošević, I. Vušanović, F. Daganand, "Energy Efficiency Strategy for Montenegro with action plan for 2005 - 2006", *Technical assistance to the Ministry of Economy and EPCG*, Podgorica, April 2005.
5. I. Vušanović, V. Čulafić, R. Bulatović, D. Bajić, M. Janjić, "Elaborat Stručne Komisije u Vezi havarije na Autoklavu Ra15 u Fabrici Glinica u KAP-u", *Mašinski fakultet Univerziteta Crne Gore*, Podgorica, Novembar 2004.

I. Monography. Books on which I. Vušanović participated as an author, co - author and editor

1. I. Vušanović, S. N. Atluri (eds), "Computational and Experimental Simulations in Engineering. ICCES 2021 (Mechanisms and Machine Science 97)", to be published in SPRINGER Nature, 2021.
2. I. Vušanović, M. Janjić, V. Lubarda, "50 godina Mašinskog fakulteta Univerziteta Crne gore: 1970 - 2020, *Univerzitet Crne Gore Cetinjska br. 2*, ISBN 978-9940-527-54-9, Podgorica, 2020.

Curriculum Vitae

Name and surname: Vedran S. Perić
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85375, Neufahrn b. Freising,
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Education

- 2016. **PhD Degree in Electrical Engineering, KTH Royal Institute of Technology, Stockholm, Sweden**, School of Electrical Engineering, Electric Power Systems (EPS) division. Joint degree of KTH Royal Institute of Technology, TU Delft and Comillas Pontifical University.

Thesis title: "Non-intrusive methods for mode estimation in power systems using synchrophasors" ([available online](#)).

- 2011. **Master's Degree** in Electrical and Computer Engineering (MSECE), University of Novi Sad, Novi Sad, Faculty of Technical Sciences, **Power Electronics and Electrical Machines** program, average grade (9.65 /10.00).
- 2008. **Master's Degree** in Electrical and Computer Engineering (MSECE), University of Novi Sad, Novi Sad, Faculty of Technical Sciences, **Power Systems Engineering** program, average grade (9.71/ 10.00).

Experience

- **01.09.2019. Head of Research Center for Combined Smart Energy Systems**
Technische Universität München, Munich School of Engineering, Munich, Germany

Main responsibilities:

- Management and co-supervision of a group of doctoral students
- Management of laboratory for combined smart energy systems (the laboratory assets exceeds 2mln euros)
- Preparation of research project proposals and project execution with cost control
- Support in laboratory exercises in courses organized by Munich School of Engineering
- Research topics: Modeling, operation and control of integrated energy systems (electric, heat/cooling and transportation)

• **01.08.2017. – 31.08.2019. Senior Power System Consultant**

GE Energy Consulting, Munich, Germany

As a consultancy firm, the core business was to provide power system expertise to utilities and energy companies. Considering the scale of typical consultancy projects (small or medium size), the power system consultant role assumes full and exclusive ownership of the project cycle, from business development, project proposals, cost control to project execution.

Main responsibilities:

- Continuously searching for opportunities and customers to provide consultancy services
- Preparation of project scope and financial proposal
- Project management with project execution and cost control
- Continuously developing personal skills which are aligned with market trends and needs

• **01.12.2016 – 31.07. 2017. Senior Business Analyst**

TSCNET Services GmbH, Business Development Team, Munich, Germany

Main responsibilities:

- Development of processes for cross-border TSO coordination including concepts, methodologies, business requirements and procedures.
- Development of prototype tools (Matlab) that demonstrate benefits of the proposed TSO coordination.
- Specification, guiding and supporting industrial software development projects.
- Marketing. Promotion of the technical solutions through conferences/workshops/trainings attendance.

• **04.04.2016 – 15.11. 2016. Senior Power System Engineer/Business Analyst**

Alstom Grid UK Limited (GE Grid Solutions), R&D department, GE WAMS Center of Excellence, Edinburgh, UK.

Main responsibilities:

- GE Technical lead of the government funded innovation project – FITNESS (Future Intelligent Transmission Network SubStation)
- Development (business analysis) of the PhasorPoint WAMS software solution

• **12.09.2011. – 03.04.2016. PhD Student** Erasmus Mundus SETS Joint Doctoral Program.

Home University: **KTH Royal Institute of Technology, Stockholm, Sweden.**

Secondary University: TU Delft, Delft, Netherlands. Guest researcher: 01.10.2013-30.06.2014. Faculty of Mechanical, Maritime and Materials Engineering (3mE), Delft Center for Systems and Control (DCSC).

Tertiary University: Comillas Pontifical University, Madrid, Spain.

• 01.10. 2008 - 31.8.2011. Power System Engineer

Telvent DMS LLC, Novi Sad, Serbia (present day **Schneider Electric DMS NS**).
In addition, I held a part time role (10% of the time) as Research and Teaching assistant at the University of Novi Sad, Faculty of Technical Sciences.

Main responsibilities:

- Development of the DMS and EMS software solutions (Power Flow, State Estimation, Distributed Generation Management, AGC)
- Power System Modelling (integration with GIS systems, CIM modeling etc)
- Project Delivery of the smart grid projects with the focus on implementation of Distribution Management System (DMS)
- DMS Customer Trainings
- Teaching Power System Modeling Course at the University of Novi Sad

Languages

- English, Serbian and basic German (B1)

Skills

Summary:

I have expertise in power utility operations combined with the knowledge of software engineering and strong background in mathematics, signal processing, control theory and system identification.

Skill set:

- Programming languages (Python, Matlab, Visual Basic, C++, Fortran, G)
- Mathematics (optimization, differential equations, algebra)
- Data Analysis (Signal Processing, System Identification, Control Theory, Artificial Intelligence, Machine Learning)
- Power system modeling and simulations
- Modeling of integrated energy systems
- Real-time monitoring and control of power systems (Wide Area Monitoring Systems (WAMS), Energy and Distribution Management Systems (EMS/DMS), SCADA (Supervisory control and data acquisition) systems)
- Real-time simulations (Opal-RT, NI Veristand)
- Project management
- Business development

Most Important Projects

- Implementation of smart grid in **Hydro One** network, **Ontario, Canada**. Position: Deputy team lead responsible for integration of distributed renewable generation. Period: 2010-2011.
- Implementation of automatic generator control and economic dispatching for **Petroproduction, Ecuador**. Position: Algorithm and Software Developer. Period: 2008-2010.
- Development of EMS solution (transmission state estimation and contingency analysis) for **Emasz Utility, Hungary**. Position: Algorithm and Software Developer. Period: 2009-2011.

- **FP7 iTesla** project - Innovative Tools for Electrical System Security within Large Areas. Position: Researcher. Period: 2012-2016.
- **FITNESS** Ofgem Innovation project (Future Intelligent Transmission Network SubStation). Position: GE technical lead for monitoring and control applications. Period: April 2016- December 2016.
- Emirates Global Aluminum Refinery – Modeling and analysis of the newly built refinery (3000MW of installed capacity). Position: Senior Power System Consultant.
- Saudi Aramco – Islanding study for Qatif Power Plant. Position: Senior Power System Consultant.
- Ras Shukeir – Development of Power Management System (PMS) logic. Position: Senior Power System Consultant.

Other Professional Activities

- Member of IEEE Power & Energy Society.
- Organization of Workshop on Synchrophasors and Control Applications for Power Systems, March 16, 2016, Stockholm, Sweden.
- Moderator (chair) of a paper forum session at IEEE PES General Meeting, Boston, MA, USA, 17-21 July 2016 (Paper Forum 2).
- Organizer and chair of a special session at IEEE PES PowerTech Conference, June 18-22, 2017, Manchester, UK. Session title: "Industry perspective on Synchrophasor technology".
- Chair of the Best Paper Session at the IEEE PES General Meeting, July 16-20, Chicago, USA
- Organizer of the tutorial on EMS and Voltage Control at the IEEE PES GM 2018,
- Member of the Technical Committee for IEEE PES ISGT Europe 2018 Conference.
- Journal Reviewer:
 - IEEE Transactions on Power Systems (ISSN: 0885-8950);
 - IEEE Transactions on Sustainable Energy (ISSN: 1949-3029);
 - IET Generation, Transmission and Distribution (ISSN: 0143-7046);
 - Control Engineering Practice (ISSN: 0967-0661);
 - Electric Power System Research (ISSN: 0378-7796)
 - International Journal of Electrical Power & Energy Systems – IJEPES (ISSN: 0142-0615);
 - Serbian Journal of Electrical Engineering - SJEE (ISSN: 1451-4869);
 - Tehnika (ISSN: 0040-2176).
- Conference Reviewer:
 - IEEE Power and Energy Society General Meeting
 - Power Systems Computation Conference
 - International Modelica Conference
 - Power and Energy Conference at Illinois
 - Power Systems Conference at Clemson University
 - IEEE PES PowerAfrica Conference 2017

Awards and grants

- TUM Seed Grant for H2020 project proposal preparation, 2019
- Two times awarded for results in regional students tournaments in Power System Analysis and Electrical Machines,

- Four times awarded by Faculty of Technical Sciences for accomplishments during studies,
- SETS Erasmus Mundus Fellowship grant, 2011,
- IntelliCIS Grant, 2016,
- Three times awarded the KTH EES travel grant.

Interests and hobbies

- Innovation Management and Marketing,
- Stock Exchange Trading and Macroeconomics,
- Human Rights and Democracy,
- Social Networking,
- Swimming and Cycling,
- Traveling,
- Everything related to aviation industry.

Publications and Presentations:

Journal Papers:

- T. Kamal, M. Karabacak, V.S. Perić, S.Z. Hassan, L.M. Fernández-Ramírez, L, "**Novel Improved Adaptive Neuro-Fuzzy Control of Inverter and Supervisory Energy Management System of a Microgrid**", *Energies* 2020, 13(18), 4721.
- Luan F.S. Colombari, Roman Kuiava, Vedran S. Perić, Rodrigo A. Ramos, "**Continuation Load Flow Considering Discontinuous Behaviors of Distribution Grids**", *IEEE Transactions on Power Systems*, vol. 34, no.5, Sept. 2019.
- Tetiana Bogodorova, Luigi Vanfetti, Vedran S. Perić, Konstantin Turitsyn, "**Identifying Uncertainty Distributions and Confidence Regions of Power Plant Parameters**", in *IEEE Access*, vol. 5, pp. 19213-19224, 2017.
- Vedran S. Perić, Xavier Bombois and Luigi Vanfretti, "**Optimal Signal Selection for Power System Ambient Mode Estimation using a Prediction Error Criterion**", *IEEE Transactions on Power Systems*, vol.31, no.4, pp.2621-2633, July 2016.
- Vedran S. Perić and Luigi Vanfretti, "**Power System Ambient Mode Estimation Considering Spectral Load Properties**", *IEEE Transactions on Power Systems*, vol.29, no.3, pp.1133-1143, May 2014.
- Vedran S. Perić, Andrija T. Sarić and Dejan I. Grabež, "**Coordinated Tuning of Power System Stabilizers based on Fourier Transformation and Neural Networks**", *Electric Power Systems Research*, vol.88, iss.1, pp.78-88, July 2012.

Non-ISI Journal Papers:

- Tijana Šćuk, Pavle Savković and Vedran S. Perić, "**Realization of simulation framework for Oasys SCADA application development using Simulink toolbox**", *Zbornik radova FTN*, vol.25. iss.5, pp.1038-1041, 2010. (in Serbian).
- Vedran S. Perić and Andrija T. Sarić, "**Small signal stability enhancement using power system stabilizers**", *Elektroprivreda*, vol.63, iss.3, pp.272-283, 2010. (in Serbian).

Books:

- Dragan S. Popović, Zvonko Gorečan, Jugoslav Dujčić, Veran Vasić and Vedran S. Perić, "**Power system modeling**", book published by DMS Group, Novi Sad, Serbia, October 2011. (in Serbian).

Conference Papers:

- Verena Kleinschmidt, Thomas Hamacher, Mohammad Reza Hesamzadeh, Vedran S. Perić, "**Unlocking Flexibility in Multi-Energy Systems: A Literature Review**", 17th International Conference on the European Energy Market (EEM), 2020. (virtual)
- Sjoerd Boersma, Xavier Bombois, Luigi Vanfretti, V. Perić, Juan Carlos Gonzalez-Torres, Roman Segur, Abdelkrim Benchaib, "**Enhanced Power System Damping Estimation via Optimal Probing Signal Design**", 22nd European Conference on Power Electronics and Applications (EPE'20 ECCE Europe), 2020. (virtual)
- Vedran S. Perić, Thomas Hamacher, Anurag Mohapatra, Franz Christiange, Daniel Zinsmeister, Peter Tzscheutschler, Ulrich Wagner, Christian Aigner, Rolf Witzmann, "**CoSES Laboratory for Combined Energy Systems At TU Munich**", IEEE PES General Meeting 2020 (virtual)

- Vedran S. Perić, Xavier Bombois and Luigi Vanfretti, "**Optimal Multisine Probing Signal Design for Power System Electromechanical Mode Estimation**", Hawaii International Conference on System Sciences (HICSS) 2017, Waikoloa Village, HI, USA, 4-7 January 2017.
- Vedran S. Perić and Luigi Vanfretti, "**Optimal PMU Placement for Power System Ambient Data-based Mode Estimation Applications**", IEEE PES Innovative Smart Grid Technologies (ISGT) Europe 2016, Ljubljana, Slovenia, 9-12 October 2016
- Maxime Baudette, Ravi Singh, Vedran S. Perić, Stig Løvlund and Luigi Vanfretti, "**In Silico Testing of a Real-Time PMU-Based Tool for Power System Mode Estimation**", IEEE PES General Meeting 2016, Boston, MA, USA, 17-21 July 2016.
- Vedran S. Perić, Tetiana Bogodorova, Ahmet N. Mete, Luigi Vanfretti, "**Model Order Selection For Probing-based Power System Mode Estimation**", Power and Energy Conference at Illinois, Champaign, IL, USA, 20-21 February 2015.
- Vedran S. Perić, Maxime Baudette, Luigi Vanfretti, Jan O. Gjerde and Stig Løvlund, "**Implementation and Testing of a Real-Time Mode Estimation Algorithm using Ambient PMU Data**", Power System Conference 2014, Clemson, SC, USA, 11-14 March 2014.
- Luigi Vanfretti, Vedran S. Perić and Jan O. Gjerde, "**Estimation of Electromechanical Oscillations in the Nordic Grid using Ambient Data Analysis**", IEEE PES General Meeting 2013, Vancouver, Canada, 21-25 July 2013.
- Luigi Vanfretti, Sebastian Bengtsson, Vedran S. Perić and Jan O. Gjerde, "**Spectral Estimation of Low Frequency Oscillations in the Nordic Grid using Ambient Synchrophasor Data under the Presence of Forced Oscillations**", IEEE PowerTech 2013, Grenoble, France, 16-20 June 2013.
- Luigi Vanfretti, Vemund .H. Aarstrand, Muhammad S. Almas, Vedran S. Perić and Jan O. Gjerde, "**A Software Development Toolkit for Real-Time Synchrophasor Applications**", IEEE PowerTech 2013, Grenoble, France, 16-20 June 2013.
- Luigi Vanfretti, Sebastian Bengtsson, Vedran S. Perić and J. O. Gjerde, "**Effects of Forced Oscillations in Power System Damping Estimation**", IEEE International Workshop on Applied Measurements for Power Systems (AMPS), Aachen, Germany, 26-28 September 2012.
- Vladimir Lj. Ljubojev, Vedran S. Perić, Veran Vasić and Andrija T. Sarić, "**Integration of Distributed Generation Models in Distribution Management System**", 30th Conference CIGRE Serbia, Zlatibor, Serbia, 29 May-3 June 2011. (in Serbian).
- Ljubomir Francuski, Aleksandar Selakov, Filip Kulić and Vedran S. Perić, "**One Solution of Implementation and Visualisation of Automatic Generation Control**", 14th Symposium CIGRE Serbia - Tara, Serbia, 16-18 June, 2008. (in Serbian)
- Vedran S. Perić and Filip Kulić, "**Matlab based Simulation of Interconnected Power Systems**", 14th Symposium CIGRE Serbia - Tara, Serbia, 16-18 June, 2008. (in Serbian).

Talks and presentations:

1. Oral Presentation (Invited Keynote Speaker): "**Moving forward to integrated energy systems**", NIDays Europe (National Instruments User Conference), Munich, Germany, 20-21 November 2019. ([available online](#))

2. Oral Presentation (Invited Speaker): **"TU Munich microgrid laboratory"**, NIDays Europe (National Instruments User Conference), Munich, Germany, 20-21 November 2019.
3. Oral Presentation: **"TU Munich microgrid laboratory"**, KTH Royal Institute of Technology, Stockholm, Sweden, 14 November 2019 (invited by prof. Lars Nordström)
4. Oral Presentation (Invited Speaker): **"Measurement-based modelling in power systems"**, International Workshop on Dynamic Stability Challenges of Future Electric Power Grids. Zurich University of Applied Sciences, 11 September 2017.
5. Oral presentation: **"Experiences in Monitoring of sub-synchronous oscillations in the UK grid"**, Meeting of IEEE Working Group on Power System Dynamics Measurements, IEEE PES General Meeting 2016, Boston, MA, USA, 17-21 July 2016.
6. Oral presentation: **"Optimal Signal Selection for Power System Ambient Mode Estimation using a Prediction Error Criterion"**, Transaction paper session, IEEE PES General Meeting 2016, Boston, MA, USA, 17-21 July 2016.
7. Oral presentation: **"Synchrophasor Applications for Distribution Networks Enhancing T&D Operation and Information Exchange"**, North American Synchrophasor Initiative (NASPI), Atlanta, GA, USA. 22-24 March 2016.
8. Oral presentation: **"Optimal Signal Selection for Power System Ambient Mode Estimation using a Prediction Error Criterion"**, Working Group on Power System Dynamics Measurements, IEEE PES General Meeting 2015, Denver, CA, USA, 26-30 July 2015.
9. Oral presentation: **"Least Costly Probing Signal Design for Power System Mode Estimation"**, North American Synchrophasor Initiative (NASPI) Work Group meeting, San Mateo, CA, USA. 23-24 March 2015.
10. Poster presentation: **"Optimal Signal Selection for Power System Ambient Mode Estimation using a Prediction Error Criterion"**, North American Synchrophasor Initiative (NASPI) Work Group meeting, San Mateo, CA, USA. 23-24 March 2015.
11. Invited talk: **"Estimation of Electromechanical Modes in Power Systems Using System Identification Techniques"**, Massachusetts Institute of Technology (MIT), MA, USA. February 2015. Invited by prof. Konstantin Turitsyn.
12. Invited talk: **"Estimation of Electromechanical Modes in Power Systems Using System Identification Techniques"**, Northwestern University, Evanston, IL, USA. February 2015. Invited by prof. Adilson Motter.

Poster presentation: **"A Software Development Toolkit for Fast Prototyping and Testing of Real-Time Synchrophasor Applications"**, Poster presented at the Second IntelliCIS Training School, Aachen, Germany, 4-8 March 2013.