

A decorative background featuring a light blue gradient with a circuit board pattern. The pattern consists of thin, dark blue lines representing traces and small circles representing components, arranged in a complex, interconnected manner. The pattern is most dense on the left side and fades towards the right.

RAČUNARSKI HARDVER

OPTIČKE MEMORIJE. VJEŽBE

ZADATAK 1

Brzina čitanja podataka (linijska brzina) kod CD-a sa CLV-om je $v=5.2$ m/s. Koliki su poluprečnici staze najbliže centru diska r_{min} , i staze najbliže periferiji diska r_{max} , ako se ugaona brzina rotacije CD-a nalazi u granicama od $\omega_{min} = 848$ rpm do $\omega_{max} = 2160$ rpm.

ZADATAK 1

$$v = 5.2 \frac{\text{m}}{\text{s}}$$

$$\omega_{\min} = 848 \text{ rpm} = 14.133 \text{ rps} = 28.266\pi \text{ rad/s}$$

$$\omega_{\max} = 2160 \text{ rpm} = 36 \text{ rps} = 72\pi \text{ rad/s}$$

$$CLV \Rightarrow v = \text{const.}$$

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$$v = \omega r \Rightarrow r = \frac{v}{\omega}$$

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$$CLV \Rightarrow v = \text{const.}$$

$$v = \omega r \Rightarrow r = \frac{v}{\omega}$$

$$r_{\min} = \frac{v}{\omega_{\max}} = \frac{5.2 \text{ m/s}}{72\pi \text{ rad/s}} = 2.3 \text{ cm}$$

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$$r_{\min} = \frac{v}{\omega_{\max}} = \frac{5.2 \text{ m/s}}{72\pi \text{ rad/s}} = 2.3 \text{ cm}$$

$$r_{\max} = \frac{v}{\omega_{\min}} = \frac{5.2 \text{ m/s}}{28.266\pi \text{ rad/s}} = 5.86 \text{ cm}$$

ZADATAK 2

Ugaona brzina kod DVD-a sa CAV-om je $\omega = 4800$ rpm. Kolike su brzine čitanja podataka (linijske brzine) na stazama koje se nalaze na rastojanju $r_1 = 2.3$ cm i $r_2 = 5.86$ cm od centra DVD-a?

ZADATAK 2

$$\omega = 4800 \text{ rpm} = 80 \text{ rps} = 160\pi \text{ rad/s}$$

$$r_1 = 2.3 \text{ cm}$$

$$r_2 = 5.86 \text{ cm}$$

$$CAV \Rightarrow \omega = \text{const.}$$

ZADATAK 2

$$\omega = 4800 \text{ rpm} = 80 \text{ rps} = 160\pi \text{ rad/s}$$

$$r_1 = 2.3 \text{ cm}$$

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$$\omega = 4800 \text{ rpm} = 80 \text{ rps} = 160\pi \text{ rad/s}$$

$$r_1 = 2.3 \text{ cm}$$

$$r_2 = 5.86 \text{ cm}$$

$$CAV \Rightarrow \omega = \text{const.}$$

$$v = \omega r$$

$$v_1 = \omega r_1 = 160\pi \frac{\text{rad}}{\text{s}} \cdot 2.3 \text{ cm} = 11.56 \text{ m/s}$$

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$$CAV \Rightarrow \omega = \text{const.}$$

$$v = \omega r$$

$$v_1 = \omega r_1 = 160\pi \frac{\text{rad}}{\text{s}} \cdot 2.3 \text{ cm} = 11.56 \text{ m/s}$$

$$v_2 = \omega r_2 = 160\pi \frac{\text{rad}}{\text{s}} \cdot 5.86 \text{ cm} = 29.45 \text{ m/s}$$

ZADATAK 3

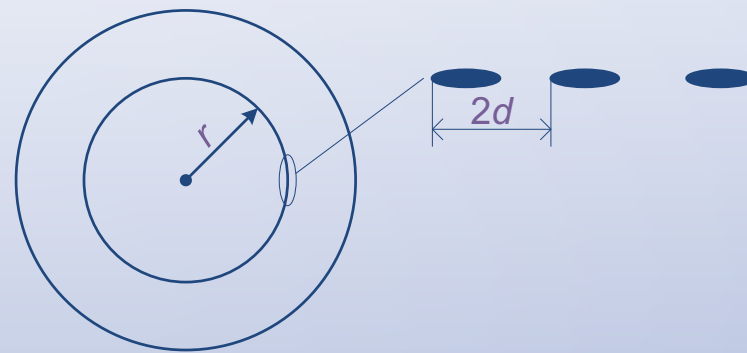
Na rastojanju 5 cm od centra CD-a nalazi se staza na kojoj se nalaze naizmjenično upisane logičke jedinice i logičke nule u formi polja i ispupčenja čija su dužine međusobno jednake i iznose $d=1 \mu\text{m}$. Ako je ugaona brzina obrtanja CD-a $\omega=300 \text{ rpm}$, izračunati frekvenciju impulsa f na izlazu iz optičkog prijemnika tokom čitanja podataka sa ove staze.

ZADATAK 3

$$r = 5 \text{ cm}$$

$$d = 1 \text{ }\mu\text{m}$$

$$\omega = 300 \text{ rpm} = 5 \text{ rps}$$



ZADATAK 3

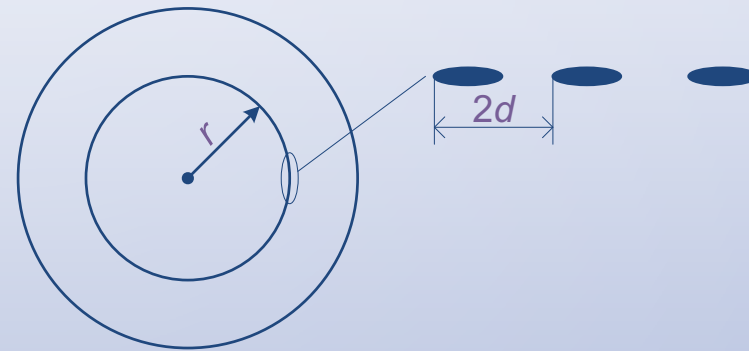
$$r = 5 \text{ cm}$$

$$d = 1 \text{ }\mu\text{m}$$

$$\omega = 300 \text{ rpm} = 5 \text{ rps}$$

Obim staze poluprečnika r :

$$O = 2r\pi = 2\pi \cdot 5 \text{ cm} = 10\pi \text{ cm}$$



ZADATAK 3

$$r = 5 \text{ cm}$$

$$d = 1 \mu\text{m}$$

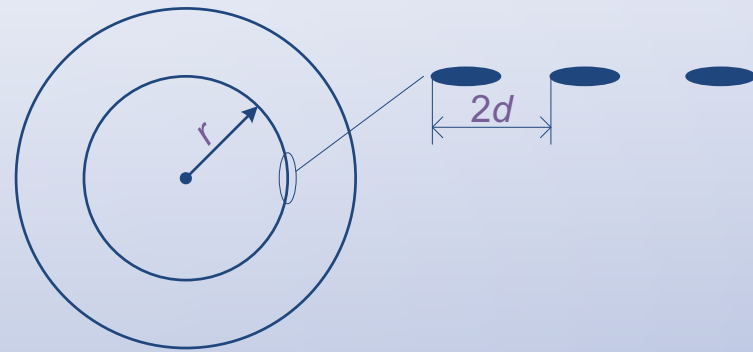
$$\omega = 300 \text{ rpm} = 5 \text{ rps}$$

Obim staze poluprečnika r :

$$O = 2r\pi = 2\pi \cdot 5 \text{ cm} = 10\pi \text{ cm}$$

Broj polja i ispuščenja na stazi:

$$N = \frac{O}{2d} = \frac{2r\pi}{2d} = \frac{10\pi \text{ cm}}{2 \mu\text{m}} = 157000$$

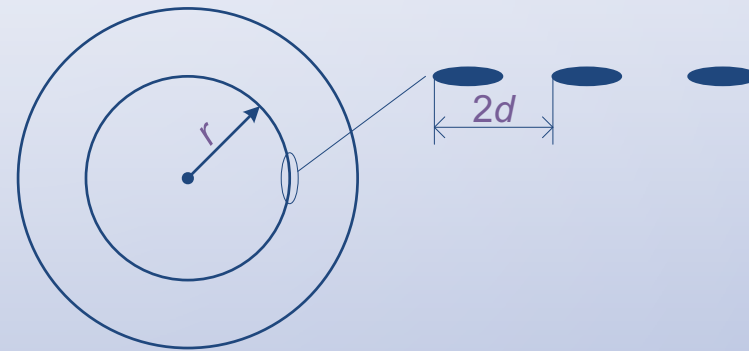


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Broj uzastopnih promjena polje-ispupčenje u jednoj sekundi:

$$f = N \cdot 5 \text{ rps} = 157000 \cdot 5 \text{ rps} = 785 \text{ kHz}$$

ZADATAK 4

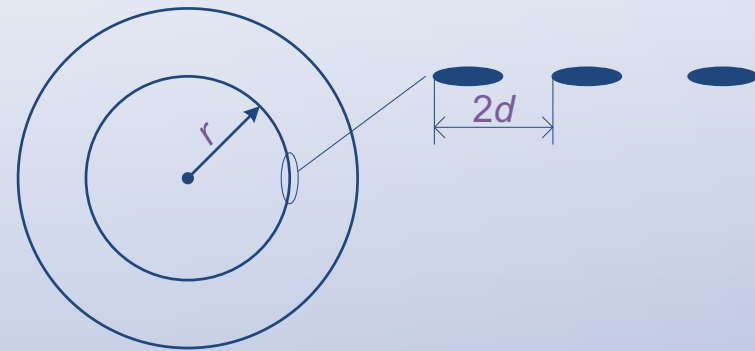
Na rastojanju r od centra DVD-a nalazi se staza na kojoj se nalaze naizmjenično upisane logičke jedinice i logičke nule u formi polja i ispupčenja čije su dužine međusobno jednake i iznose $d=0.5 \mu\text{m}$. Ako je ugaona brzina obrtanja DVD-a $\omega=1200 \text{ rpm}$, a frekvencija impulsa na izlazu iz optičkog prijemnika tokom čitanja podataka sa ove staze $f=5 \text{ MHz}$, izračunati rastojanje r od centra DVD-a na kojoj se nalazi posmatrana staza.

ZADATAK 4

$$f = 5 \text{ MHz}$$

$$d = 0.5 \text{ } \mu\text{m}$$

$$\omega = 1200 \text{ rpm} = 20 \text{ rps}$$



ZADATAK 4

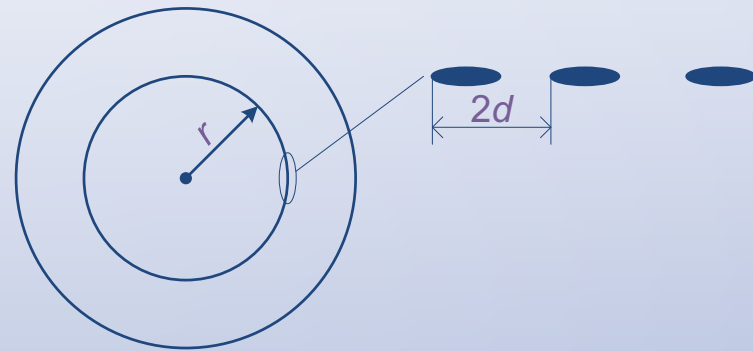
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$$\omega = 1200 \text{ rpm} = 20 \text{ rps}$$

Obim staze poluprečnika r :

$$O = 2r\pi$$



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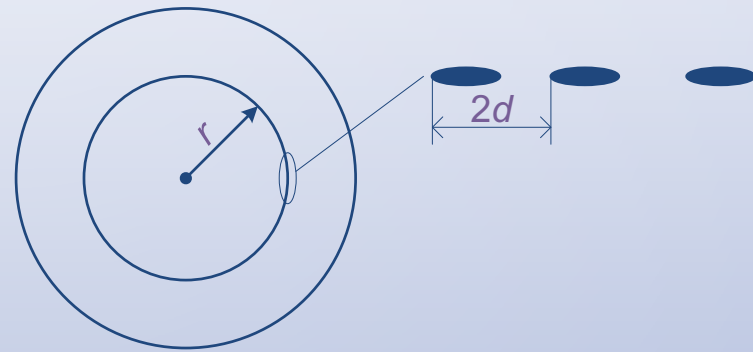
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Obim staze poluprečnika r :

$$O = 2r\pi$$

Broj polja i ispuščenja na stazi:

$$N = \frac{O}{2d} = \frac{2r\pi}{2d} = \frac{r\pi}{d}$$



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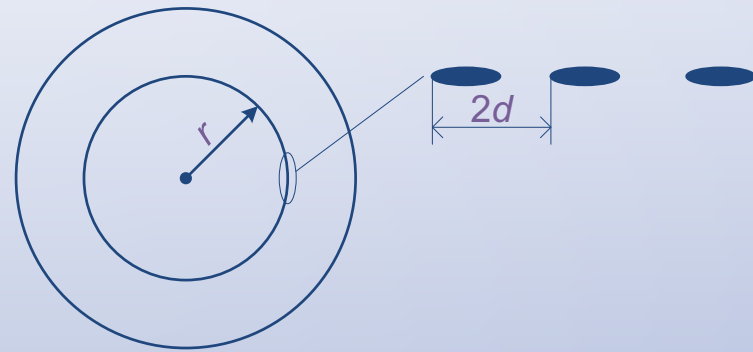
$$O = 2r\pi$$

Broj polja i ispuščenja na stazi:

$$N = \frac{O}{2d} = \frac{2r\pi}{2d} = \frac{r\pi}{d}$$

Broj uzastopnih promjena polje-ispuščenje u jednoj sekundi:

$$f = \frac{r\pi}{d} \cdot 20 \text{ rps}$$

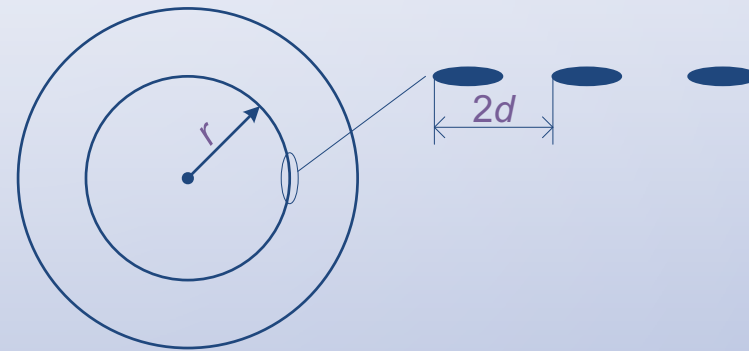


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$$N = \frac{O}{2d} = \frac{2r\pi}{2d} = \frac{r\pi}{d}$$

Broj uzastopnih promjena polje-ispuščenje u jednoj sekundi:

$$f = \frac{r\pi}{d} \cdot 20 \text{ rps} \Rightarrow r = \frac{fd}{20\pi \text{ rps}} = \frac{5 \text{ MHz} \cdot 0.5 \text{ } \mu\text{m}}{20\pi \text{ rps}} = 3.98 \text{ cm}$$