



LPR Cup

10.s01.e03



*The moral of the story is not to listen to those
who tell you not to play the violin
but stick to the drum.*

Jose Mourinho, football coach and translator

Drum

Cheburashka used metallized thin leather to make the drum. When he carefully stretched the skin on a metal ring of radius $R = 20 \text{ cm}$ it turned out that the compression force in the metal ring $T = 30 \text{ N}$. During the test, the pressure in the resonator of the drum was lowered by $\Delta p = 100 \text{ Pa}$ compared to atmospheric.

1. At what distance h from the drum will the reflected from membrane rays gather if you light it with a flat beam parallel to the axis of the drum. *(6 points)*
2. Find the distance between the source located on the axis of the drum and its image obtained in this mirror, if the distance from the source to the drum's membrane is 125 cm. *(1 points)*
3. Find the speed of the image movement in this point (module and direction) if the source is located on the axis of the drum and moves towards it at a speed of 4 m/s. *(3 points)*

Each section of the drum is deformed the same way, the change in the size of any section of the drum is much smaller than its linear dimensions.

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First hint — 11.05.2020 14:00 (Moscow time)

Second hint — 13.05.2020 14:00 (Moscow time)

Final of the third round — 15.05.2020 22:00 (Moscow time)