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APPLICATION OF BROADBAND RADIATION OF PLASMA RELATIVISTIC SOURCES TO DETERMINE THE REFRACTIVE INDEX OF CONDENSED MATTER IN THE RANGE OF 2 – 4 GHZ *)

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Model experiments are considered to determine the refractive index of plexiglass bars in the microwave radiation region of 2–4 GHz. The radiation source is the generation of a plasma relativistic microwave source operating in the broadband radiation mode [1] with a power of 100 MW and a duration of 500 ns. The radiation is directed into a rectangular waveguide 72×34 mm, in which two identical antennas A and B are installed at a distance L = 1.2 m from each other. The antennas represent the central core of the cable and are inserted through the middle of the wide wall of the waveguide inside to a depth of 5 mm. Behind the last antenna B, at a distance of ≈ 3 cm, there is a metal plunger from which the wave is reflected. Between the plunger and antenna B, a plexiglass block measuring 71×33×d mm is inserted into the waveguide. Fig. 1 shows an interference pattern in the form of a comb, which is the result of dividing the spectrum on antenna B by spectrum A.

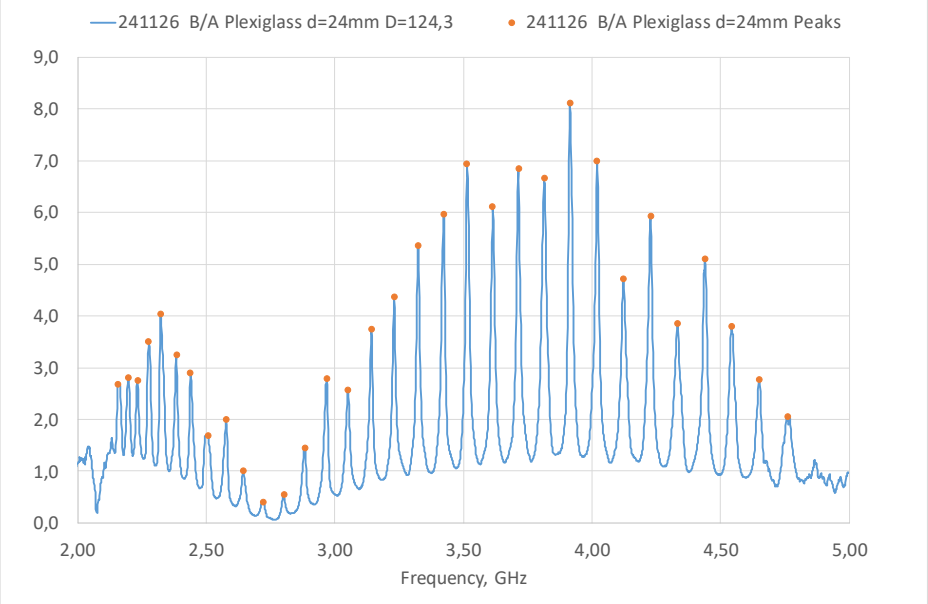

Fig. 1. *Interference pattern (comb) when the thickness of the bar d = 24 mm, and the distance from the piston to the antenna B is 43 mm.*

Depending on the thickness of the bar d and the distance between the antenna A and the piston D, the frequency arrangement of the peaks of the interference pattern changes. The refractive index of the bar material is calculated from the totality of these data.

References

[1]. P.S. Strelkov, V.P. Tarakanov, D.E. Dias Mikhailova, I.E. Ivanov, D.V. Shumeiko PLASMA PHYSICS, 2019, Vol. 45, No. 4, pp. 335–345

*) abstracts of this report in Russian