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An influence of plasma on the wakefield amplitude excited in a dielectric structure by bunch train

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An influence of plasma on wakefield amplitude excited in dielectric structure by a sequence of relativistic electron bunches is investigated. The considered structure is a dielectric waveguide of a cylindrical configuration with the axial drift channel filled with plasma. Dependences of amplitude of longitudinal electric field on plasma density for three cases are obtained: a) parameters of dielectric structure and bunch train are fixed; b) inner or c) external radius of a dielectric tube is changed according to the change of plasma frequency. For the cases b) and c) the bunch repetition frequency is tuned to the plasma frequency and frequency of the first radial mode of a dielectric wave. It is shown that in the case of fine tuning of frequencies of eigen waves to the bunch repetition frequency due to the change of external radius of structure the interval of plasma densities where amplitude of excited wakefield is significantly higher, than in a vacuum structure, can be enlarged in comparison with two other analyzed cases.

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