DISSIPATIVE INSTABILITY IN A WAVEGUIDE WITH ANNULAR BEAM AND PLASMA

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Plasma filled microwave sources promise to be of record power and of tunable frequency. They represent cylindrical metallic waveguide filled by thin annular plasma and beam pipes (radii do not coincide) in external longitudinal magnetic field [1]. In [2] was shown such a configuration is favorable to trigger a new type of dissipative beam instability (DBI) with more critical, as compared to conventional, inverse proportional dependence of the growth rate on the dissipation. This result has been obtained under assumption that the beam and the plasma layers are infinitesimal thin.

The assumption of infinitesimal thinness of the layers essentially restricted applicability of the obtained result. Present investigation substantiates the new type of dissipative beam instability for the beam and the plasma layers of finite thickness and actually serves as a link to real systems for microwave generation and amplification.

For presented configuration with layers of finite thickness the growth rate of the new type of DBI is obtained not only in the limits $\nu \to 0$ (ν is the collision frequency in plasma) and $\nu \gg \delta$ (δ is the growth rate of no dissipative instability) but for arbitrary value of the ratio ν/δ.

References

1. M.V. Kuzelev and A.A.Rukhadze, *Free Electron Lasers*. English Completed Edition. Edititon Frontier, Paris, 1995
2. E.V. Rostomyan, Europhys Letters, **77**, 45001 (2007)

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