Hybrid Čerenkov mode in a resonant medium

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Energy stored in a resonant medium may be used to amplify the Čerenkov radiation generated by a small driving bunch. The hybrid eigenmode of the system is a combination of Čerenkov radiation and eigenmode of the resonant medium. In the vicinity of the resonant frequency of the medium and when Čerenkov condition is satisfied, the eigenfrequency has an imaginary part. The latter occurs in a relatively limited range of energies of the driving bunch and it depends on the guiding geometry and on the population inversion. Simulation results of electron acceleration using this eigenmode are presented.

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