

Abstract Submitted
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Optical instabilities and spontaneous light emission in moving media¹ MARIO SILVEIRINHA, Univ of Coimbra - Instituto de Telecomunicacoes — We show that when an uncharged plasmonic material is set in relative motion with respect to another uncharged polarizable body the system may be electromagnetically unstable. Particularly, when the relative velocity of the two bodies is enforced to remain constant the system may support natural oscillations that grow exponentially with time, even in presence of realistic material loss and dispersion. It is proven that a friction-type force acts on the moving bodies to oppose their relative motion. Hence, the optical instabilities result from the conversion of kinetic energy into electromagnetic energy. This new purely classical phenomenon is analogous to the Cherenkov and Smith-Purcell effects but for uncharged polarizable matter. We link the optical instabilities to a spontaneous parity-time symmetry breaking of the system, and demonstrate the possibility of optical amplification of a light pulse in the broken parity-time symmetry regime.

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Mario Silveirinha
Univ of Coimbra - Instituto de Telecomunicacoes

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