

Space-time resonances and high-frequency instabilities in two-fluid Euler-Maxwell systems

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Abstract

Space-time resonances induce high-frequency instabilities in the two-fluid Euler-Maxwell system. The instabilities correspond to the growth of the Raman and Brillouin components of the electric field. This implies in particular that the Zakharov approximation to Euler-Maxwell describing Langmuir turbulence is unstable for non-zero group velocities. We show that resonances correspond to the locus of weak hyperbolicity. Around the resonant set, we analyze the symbol of the linearized equations around WKB solutions. The symbol satisfies an auxiliary transport equation with a reaction term. Around space-time resonances the transport operator degenerates and fast instabilities arise. This is joint work with Eric Dumas (Grenoble) and Lu Yong (Nankai).