Relativistic Fluid Theory of Electromagnetic Instabilities[1] FRED HARTEMANN, SHELDON WU, LLNL — Electromagnetic instabilities are analyzed within the context of a manifestly covariant fluid formalism. Starting from an arbitrary adiabatic background fluid state, and using perturbation theory, we derive a minimal set of four 3rd order PDEs in the 4-potential perturbation. A general dispersion relation is derived for plane waves, and analyzed for convective and absolute instabilities. This theory applies to several physical systems, such as coherent radiation sources, high-energy accelerators, ICF and astrophysical plasmas. Prepared by LLNL under Contract DE-AC52-07NA27344.

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