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Magnetic Field Effect on Rayleigh-Taylor and Darrieus-Landau Instabilities[1] FERNANDO GARCIA RUBIO, RICCARDO BETTI, Laboratory for Laser Energetics. University of Rochester, JAVIER SANZ, Universidad Politecnica de Madrid, HUSSEIN ALUIE, University of Rochester — The Rayleigh-Taylor (RT) and Darrieus-Landau (DL) instabilities are discussed in an inertial confinement fusion context within the framework of small critical-to-shell density ratio and weak acceleration regime. The quasi-isobaric analysis in Sanz et al. [Phys. Plasmas 13, 102702 (2006)] is completed with the inclusion of non-isobaric and self-generated magnetic field effects. The use of a Sharp Boundary Model leads to a single analytical expression of the dispersion relation encompassing both instabilities. The two new effects come into play by modifying the perturbed mass and momentum fluxes at the ablation front. The momentum flux (perturbed pressure at the spike) is the predominant stabilizing mechanism in the RT limit and the driving mechanism in the DL limit. The non-isobaric effects modify notably the scaling laws in the DL limit ($k<<1$). The magnetic fields are generated due to misalignment between pressure and density gradients (Biermann Battery effect). They affect the hydrodynamics by bending the heat flux lines. Within the framework of this paper, they enhance ablation, resulting in a stabilizing effect that peaks for perturbation wavelengths comparable to the conduction layer width.

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Fernando Garcia Rubio
Laboratory for Laser Energetics. University of Rochester

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