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The Dynamics of Rayleigh-Taylor Stable and Unstable Contact Discontinuities with Anisotropic Thermal Conduction[1] DANIEL LECOANET, IAN PARRISH, ELIOT QUATAERT, University of California - Berkeley — We study the effects of anisotropic thermal conduction along magnetic field lines on an accelerated contact discontinuity in a weakly collisional plasma. Anisotropic conduction can result in doubly-diffusive instabilities, including the magnetothermal instability (MTI) and the heat flux driven buoyancy instability (HBI). We run fully non-linear numerical simulations of a contact discontinuity with anisotropic conduction. The non-linear evolution can be described as a superposition of three physical effects: temperature diffusion due to vertical conduction, the Rayleigh-Taylor instability (RTI) and the HBI. In simulations with RTI-stable contact discontinuities, the temperature discontinuity spreads due to vertical heat conduction. The HBI slows this temperature diffusion by reorienting initially vertical magnetic field lines to a more horizontal geometry, eventually stopping vertical temperature diffusion. In simulations with RTI-unstable contact discontinuities, the dynamics are initially governed by temperature diffusion, but the RTI becomes increasingly important at late times. These results could be important in various astrophysical contexts including supernova remnants, solar prominences and cold fronts in galaxy clusters.

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