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The Effect of Anomalous Resistivity on Electrothermal Instability Growth[1] ROBERT MASTI, Lawrence Livermore National Laboratory, BHUVANA SRINIVASAN, Virginia Tech, C. LELAND ELLISON, WILLIAM FARMER, Lawrence Livermore National Laboratory — The current driven ETI (Electrothermal instability) forms when the material resistivity is temperature dependent, occurring in nearly all Z-pinch-like high energy density platforms. Simulations of ETI typically use a collisional based form of the resistivity as provided, e.g., in a Lee-More Desjarlais conductivity table, but in regions of low density collisionless transport needs to be incorporated to properly simulate the ETI growth. Anomalous resistivity is an avenue by which collisionless micro turbulent effects can be incorporated into a collisional resistivity, allowing for a better representation of these low density regions during ETI. Such low density plasmas may be present due to ablated liner material, plasmas injected by the powerflow, or in gas puff targets. Because the ETI growth rate depends on the derivative of resistivity with respect to temperature, anomalous resistivity may have a significant impact on the evolution of the ETI through its own temperature dependence. Comparisons are shown using the Ares multiphysics code with and without the incorporation of various anomalous resistivity models during ETI growth.

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