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LES-MHD Models for Turbulence GEORGE VAHALA, TAO WANG, William & Mary, MIN SOE, Rogers State University, LINDA VAHALA, Old Dominion University — Large Eddy Simulation (LES) models for MHD turbulence are required when the Lundquist and Reynolds numbers become too high for adequate spatial resolution. All previous LES-MHD models are usually based on the filtered equations for the velocity and magnetic field. To achieve closure one must approximate the nonlinear fluctuation terms. For the mean velocity field it is typically assumed that the effect of the nonlinear velocity-magnetic fluctuations results only in an eddy viscosity, while for the mean magnetic field closure is typically achieved by the introduction of an eddy resistivity. Here we present a new LES-MHD model based on the Elsasser representation of MHD. Using the same logic as in previous LES-MHD models, we now find on transforming back from the Elsasser variables that the mean velocity and magnetic field evolutions are each dependent on both an eddy viscosity and eddy resistivity. A lattice Botlzmann representation is then determined for this new LES-MHD model.

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