Abstract Submitted
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Magnetohydrodynamic turbulence model[1] JAMES HAMMER, Lawrence Livermore National Laboratory — K-epsilon models find wide application as approximate models of fluid turbulence. The models couple equations for the turbulent kinetic energy and dissipation rate to the usual fluid equations, where the turbulence is driven by Reynolds stress or buoyancy source terms. We generalize to the case with magnetic forces in a Z-pinch geometry (azimuthal fields), using simple energy arguments to derive the turbulent source terms. The field is presumed strong enough that 3 dimensional twisting or bending of the field can be ignored, i.e. the flow is of the interchange type. The generalized source terms show the familiar correspondence between magnetic curvature and acceleration as drive terms for Rayleigh-Taylor and sausage instability. The source terms lead naturally to a modification of Ohm's law including a turbulent electric field that allows magnetic field to diffuse through material. The turbulent magnetic diffusion parallels a corresponding ohmic heating term in the equation for the turbulent kinetic energy.

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