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**Geometrodynamical Fluid Theory Applied to Dynamo Flows in Planetary Interiors** KAYLA LEWIS, Monmouth University, DIEGO MIRAMONTES, College of Wooster, DILLON SCOFIELD, University of Oklahoma — Due to their reliance on a Newtonian viscous stress model, the traditional Navier-Stokes equations are of parabolic type; this in turn leads to acausal behavior of solutions to these equations, e.g., a localized disturbance at any point instantaneously affects the solution arbitrarily far away. Geometrodynamical fluid theory (GFT) avoids this problem through a relativistically covariant formulation of the flow equations (Phys. Lett. A 374 3476-82 (2010)). Using GFT, we derive the magnetohydrodynamic equations describing the balance of energy-momentum appropriate for dynamo flows in planetary interiors. These equations include interactions between magnetic and fluid vortex fields. We derive scaling laws from these equations and compare them with scaling laws derived from the traditional approach. Finally, we discuss implications of these scalings for flows in planetary dynamos.

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