Abstract Submitted
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Magnetohydrodynamically generated toroidal and poloidal velocities in confined plasma[1] JORGE A. MORALES, WOUTER J.T. BOS, LMFA-CNRS, Ecole Centrale de Lyon-Universite de Lyon, Ecully, France, KAI SCHNEIDER, M2P2-CNRS & CMI, Aix-Marseille Universite, Marseille, France, DAVID C. MONTGOMERY, Department of Physics and Astronomy, Dartmouth College, Hanover, New Hampshire, USA — The spatio-temporal self-organization of visco-resistive magnetohydrodynamics in a toroidal geometry is studied in the presence of curl free imposed toroidal magnetic and current density fields, with uniform transport coefficients. The computation involves no microscopic instabilities or kinetic theory and is purely magnetohydrodynamic (MHD) in nature. The computation makes use of the recently developed "penalty method" to enforce visco-resistive boundary conditions. It is observed that a flow is generated and that an up-down asymmetry of the geometry causes the generation of a nonzero toroidal angular momentum. An analysis of the dynamics is presented and the physical origin of the toroidal velocity is illustrated. It is shown that the safety factor has an influence on the sign of the toroidal velocity and on its profile. The result of the inversion of the imposed toroidal magnetic field is also discussed.

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Kai Schneider
M2P2-CNRS & CMI, Aix-Marseille Universite, Marseille, France

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