— INTERNATIONAL SYMPOSIUM
ON GEOPHYSICAL AND ASTROPHYSICAL DYNAMOS —

Growth rate degeneracies in kinematic dynamos

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We study kinematic dynamo action in simple steady flows. We show that the kinematic growth rate of any dynamo is the same for two different types of boundary conditions (perfect electrical conductivity and infinite magnetic permeability) providing that one can find a transformation changing the velocity field $\boldsymbol{u}$ into $-\boldsymbol{u}$. This surprising conclusion is a consequence of the adjointness properties of the induction operator. We illustrate numerically this result in Cartesian (rotating Boussinesq convection) and spherical (S_2T_2 flows) geometries.

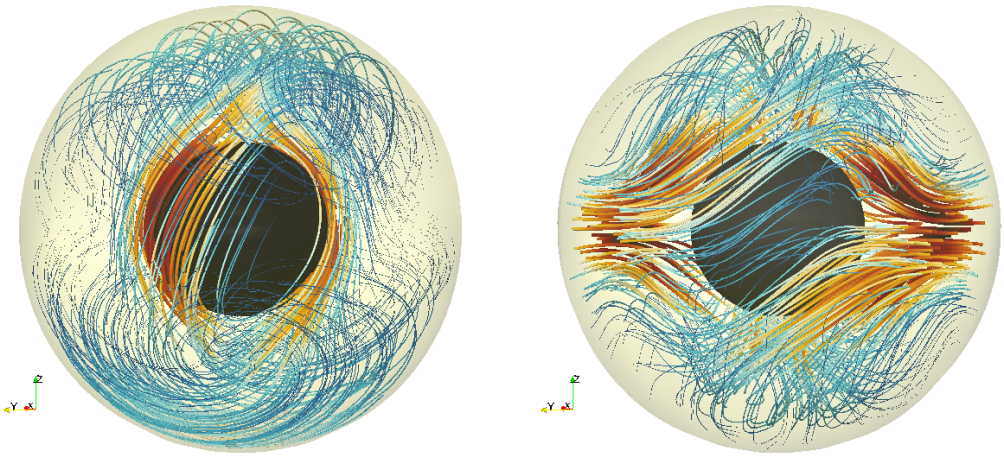

Figure 1: Magnetic eigenmodes driven by a non-axisymmetric S_2T_2 flow in a spherical shell. The boundary conditions are perfectly conducting on the left and infinite magnetic permeability on the right. The growth rate associated with these eigenmodes is rigorously the same.

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