Abstract Submitted
for the DFD05 Meeting of
The American Physical Society

Anisotropy of scalar transport in conductive flows at low magnetic Reynolds numbers. BERNARD KNAEPEN, Universite Libre de Bruxelles, MAXIME KINET, DANIELE CARATI — Conductive flows at low magnetic Reynolds numbers are encountered in many industrial applications. For example, in the steel industry, applied magnetic fields can be used to damp turbulence in the casting process. In nuclear fusion devices (Tokamaks), liquid lithium flows are used as coolant blankets and interact with the surrounding magnetic field that drives and confines the fusion plasma. An important characteristic of such flows is the development of a strong anisotropy. This anisotropy can be twofold. Firstly, flows structures tend to elongate in the direction of the magnetic field (morphological anisotropy). Secondly, the magnetic field can severely alter the partition of energy between the components of the velocity field parallel or orthogonal to its direction (even in the case of homogeneous turbulence). In this work we study numerically how the transport of a passive scalar is affected by those two kinds of flow anisotropies. For the regimes considered, it is shown that the morphological anisotropy is the factor that is most influential on the anisotropic scalar transport.

Bernard Knaepen
Universite Libre de Bruxelles

Date submitted: 29 Jul 2005 Electronic form version 1.4