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Accounting for anomalous energy-dissipation in guided flows PABLO HUQ, College Earth, Ocean, and Environment, Univ. Delaware, DILLON SCOFIELD, Dept. of Physics, Oklahoma State University — The Navier-Stokes theory significantly underestimates energy-dissipation in time-dependent flows through flow guides such ones with helical geometry. We show the geometrodynamical theory of fluids (GTF) accounts for this anomalous energy-dissipation by predicting the excitation of transverse modes of flow leading to such dissipation. According to the GTF, the transverse modes are composed of vorticity and swirl fields which together constitute a vortex field F which is a function of the swirl and vorticity fields. Analysis shows the energy-dissipation depends on the wave energy, the dot product of the swirl and the vorticity, as well as their cross product. These lead to heating of the fluid at a rate proportional to the work the current does against the swirl field. For the constitutive parameters of the theory we find the values for water to be lamda = 0.01/(cm/s), and kappa = 1 [unitless]. A lower bound for the effective value of the speed of the first transverse modes is found to be 90 cm/sec. We determine that a dimensionless vortex number, Rv, usefully delineates the excitation of the transverse mode flow regime.

Pablo Huq
College Earth, Ocean, and Environment, Univ. Delaware

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