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The role of turbulence driven by tidal and librational forcing in planetary fluid layers. ALEXANDER GRANNAN, University of California-Los Angeles, BENJAMIN FAVIER, Aix-Marseille Universite, CNRS, Ecole Centrale Marseille, IRPHE UMR 7342, BRUCE BILLS, Jet Propulsion Laboratory, Caltech, Pasadena, CA, USA, MICHAEL LE BARS, Aix-Marseille Universite, CNRS, Ecole Centrale Marseille, IRPHE UMR 7342, JONATHAN AURNOU, University of California-Los Angeles — The turbulence generated in the liquid metal cores and oceans of planetary bodies can have profound effects on energy dissipation and magnetic field generation. An important driver of such turbulence is mechanical forcing from precession, libration, and tidal forcing. On Earth, such forcing mechanisms in the oceans are crucial but the role that such forcings play for other planetary bodies also possessing oceans and liquid metal cores are not generally considered. Recent laboratory experimental and numerical studies of Grannan et al. Phys. Fluids 2014, Favier et al. Phys. Fluids 2015, and Grannan et al. Geophys. J. Int. 2016 have shown that turbulent flow is driven by an elliptic instability which is a triadic resonance between two inertial modes and the base flow. Based on the most recent work, a generalized scaling law for the saturated r.m.s. velocity is found, $U \sim \beta$, where β is the dimensionless equatorial ellipticity of the body. Using planetary values for tidal and librational forcing parameters, we argue that mechanically forced turbulent flows can play a significant role in dissipative processes, mixing, and magnetic field generation.

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