Nonlinear flows driven by libration in a rotating half cone

MICHAEL PATTERSON, ROSEN RACHEV, Department of Mechanical Engineering, University of Bristol, BS8 1TR, UK, LIGANG LI, KEKE ZHANG, Department of Mathematical Sciences, University of Exeter, Exeter EX4 4QF, UK — We investigate the problem of nonlinear oscillatory flow of homogeneous fluid with viscosity ν confined in a half cone that rotates rapidly about a fixed axis with angular velocity Ω_0 and that undergoes weak longitudinal libration with amplitude $\epsilon\Omega_0$ and frequency $\hat{\omega}\Omega_0$, where ϵ is the Poincaré number and $\hat{\omega}$ is dimensionless frequency with $0 < \hat{\omega} < 2$. Two different methods are employed in this investigation: experimental studies and direct numerical simulation using a finite element method.

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