FAST SINGULAR OSCILLATING LIMITS OF HYDRODYNAMIC PDES: APPLICATION TO 3D ROTATING NAVIER-STOKES, BOUSSINESQ AND MHD EQUATIONS

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ABSTRACT

Methods of harmonic analysis and dispersive properties are applied to 3d rotating Navier-Stokes, Boussinesq and MHD equations to obtain long-time or global existence results. Smoothness assumptions for initial data are the same as in local existence theorems. Techniques for fast singular oscillating limits are used and large or infinite time regularity is obtained by bootstrapping from global regularity of the limit equations. The latter gain regularity from 3d nonlinear cancellation of oscillations. Applications include 3D Rotating Navier-Stokes, Boussinesq and MHD equations.