Texas Tech University. Analysis Seminars.

Asymptotic expansions in time for solutions of Navier-Stokes equations of rotating fluids.

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ABSTRACT. We consider the Navier-Stokes equations of viscous, incompressible, rotating fluids in the three-dimensional periodic domains. In the case the velocity field has zero average, we prove that any Leray-Hopf weak solution admits an asymptotic expansion in Gevrey spaces, as time tends to infinity, in terms of the the exponentially decaying functions, with the coefficients being "sinusoidal polynomials", i.e., combinations of the power, sine and cosine functions of time. In the general case, by using a transformation of the Galilean type, we show that any global, classical solution admits a similar asymptotic expansion with the coefficients being "double sinusoidal polynomials". To deal with the Coriolis force, we use the Poincaré wave to transform the equations to a more convenient form, for which the asymptotic expansions can be obtained by using Foias-Saut original ideas and its modification by Martinez and myself. This is a joint work with Ciprian Foias and Edriss Titi.