ESI Erwin Schrödinger International Institute for Mathematics and Physics

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DVR 0065528

Colloquium Talk

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Lagrangian approach to wave-induced flow in a viscous rotating ocean

Wednesday, March 7, 2018

at 14:40 h

ESI, Boltzmann Lecture Hall

Abstract: The presence of viscosity has a profound effect on the wave-induced drift. In a pioneering paper (Longuet-Higgins, 1953) it was demonstrated that the inclusion of a small viscosity not only modified the motion in thin boundary layers near the surface and at the bottom, but also produced significant changes from Stokes (1847) irrotational solution in the interior. We here present results for wave-induced drift in a fluid layer of finite depth by applying a direct Lagrangian description of fluid motion. The Lagrangian form is (usually) more mathematically demanding than the traditional Eulerian approach. However, it yields directly the mean particle drift velocity in periodic motion. The solution to the wave-drift problem in a Lagrangian description depends crucially on the viscosity v being non-zero, however small. It exemplifies the singular nature of this problem, in which the limit of solutions as $v \to 0$ is different from solutions obtained with v=0.

A. Constantin

February 26, 2018