**SEMINARIOS DEL DEPARTAMENTO DE FÍSICA FUNDAMENTAL**


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# "Reversible Diffusion by Thermal Fluctuations"


*We study diffusive mixing in the presence of thermal fluctuations when the Schmidt number is large. In this regime, relevant to liquids, we obtain a closed equation for the concentration which, in addition to the expected advection by a random velocity, contains a diffusive thermal drift term with diffusion coefficient obeying a Stokes-Einstein relation.*

*This equation captures both the enhanced diffusion in the ensemble-averaged mean and the long-range correlated giant fluctuations in individual realizations of the mixing process. It is also amenable to efficient numerical solution. Through a combination of Eulerian and Lagrangian numerical experiments we demonstrate that mass transport in liquids can be modeled at all scales, from the microscopic to the macroscopic, not as irreversible Fickian diffusion, but rather, as reversible random advection by thermal velocity fluctuations.*

*Our model gives effective dissipation with a diffusion coefficient that is not a material constant as its value depends on the scale of observation. Our work reveals somewhat unexpected connections between flows at small scales, dominated by thermal fluctuations, and flows at large scales, dominated by turbulent fluctuations.*


**Viernes, 20 de septiembre de 2013, 11:30 h**

Sala 05, Facultad de Ciencias, UNED

Pº de la Senda del Rey, 9. (Puente de los Franceses)