CONVECTION BEYOND RAYLEIGH AND BÉNARD

COLLOQUIUM SERIES

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THURSDAY, APRIL 13 – 4:30PM

WEXLER HALL - WXLR 21 (lower level)

Rayleigh–Bénard convection is a canonical flow in fluid mechanics, with applications in industry, geophysics, astrophysics and beyond. Investigations have examined linear and nonlinear stability as well as deriving analytical bounds on quantities of interest, while laboratory and numerical experiments have given insight into the behavior at large Rayleigh numbers. Generalizations such as the case of convection in porous media, as well as the effect of rotation and magnetic fields, can be found in textbooks. In this talk I will discuss two less well-known cases. First, periodically-driven convection, in which the temperature along one boundary varies periodically in time. This provides a model for heating of the waters of Lake Superior in Spring. Second, horizontal convection, in which the temperature (or buoyancy) varies along a horizontal boundary. This case offers a simplified model for e.g. large-scale oceanic flows induced by horizontal buoyancy gradients. I will review previous known results, and present more recent work on the stability and behavior of these flows.

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