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Baylor Sciences Building D 110

Baylor University
Waco, Texas

Diffusion-type Equations: From the Heat Equation to Long Distance Interactions

The heat equation (an equation that describes how heat propagates along a solid, for instance along a metal rod) was proposed by Fourier in 1807. It describes how temperature evolves in time given the influx of heat from its infinitesimal surrounding. It was soon realized that the pointwise evolution of other modeled systems (speed of a fluid, density and deformation of an elastic body, price of goods, populations) adjusts and reverts to its surroundings revealing a universality property that made it fundamental to science. On the other hand, in many cases, diffusion processes involve long range interactions including population dynamics, pricing and atmospheric events. We will give an overview of the mathematics involved.