



This Spring the Math Department offers the graduate course...

MATH 648M: Advanced Analytic Methods in Applied Math

TuTh 11:00-12:15pm, Rm Math 0409

Website: www.math.umd.edu/~trivisa/648M_S11.html

Instructor: Konstantina Trivisa (trivisa@math.umd.edu, x5-6865)

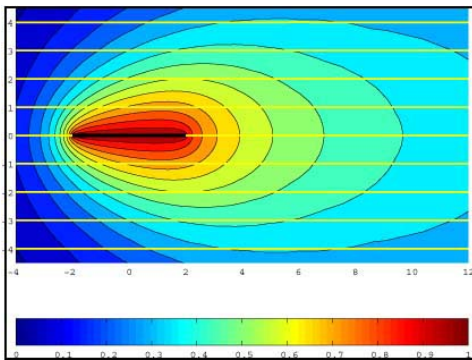


FIG. 1: Temperature around a plate (red: hot, to blue: cold). This can be derived by asymptotics to a PDE.

FOCUS: *Concepts and analytical tools used in various scientific disciplines. Applications from condensed matter physics, fluid and solid mechanics, materials science, quantum mechanics, biology, number and probability theory.*

TOPICS: PART I: ASYMPTOTICS: Asymptotics and perturbations for Ordinary & Partial Differential Eqs. (ODE's & PDE's) and difference eqs: WKB analysis; boundary layers; homogenization theory; multiscale expansions.

PART II: STOCHASTIC TOOLS: Review of probability theory. Brownian motion. Monte Carlo methods. Langevin & Fokker-Planck eqs. Stochastic ODE's, PDE's. Methods of statistical mechanics. Mori-Zwanzig formalism. Renormalization. Model reduction. Relations of **II** & **I**: Stochastic processes & homogenization.

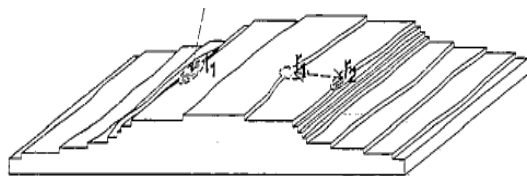


FIG. 2: Line defects (steps) on crystal surfaces fluctuate. Their motion is described by stochastic ODE's.
(Jeong & Williams, *Surf.Sci. Rep.* 1999)

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