



WPI

HAROLD J GAY LECTURE SERIES

PDEs and Fractals

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Quasistaticity

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Higgins Labs 116



ABSTRACT A problem for the evolution in time of some system is said to have a quasistatic approximation when the velocity and acceleration are neglected. These derivatives can usually be neglected if they have coefficients that are small parameters. In this case, formal asymptotic methods might exhibit the detailed effects of these parameters. Rigorous asymptotic justifications, which provide error estimates and are typically far harder to carry out, are used by those compulsive about mathematical hygiene, but seldom say more than the formal methods. The purpose of this lecture is to give rigorous justifications of the quasistatic behavior of solutions of the differential equations governing a couple of conceptually simple problems from particle and continuum mechanics. The justification for these justifications is that the solutions of these simple problems exhibit strange and surprising behavior.

Geometry with its applications has been at the heart of the development of partial differential equations and boundary value problems since the very beginning. In physics, biology, economics, and other applied fields, a variety of new problems are now emerging that display unusual geometrical, analytical and scaling features, possibly of fractal type. The objective of these lectures is to acquire the view of outstanding mathematicians on the subject of differential equations and fractals, and their developments and applications, in a broad perspective encompassing both classical highlights and contemporary trends.

Sponsored by WPI and hosted by the Department of Mathematics

Coffee and tea available one half hour before lecture time

Participation of faculty and students is most welcome

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