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THE FIELDS INSTITUTE FOR RESEARCH IN MATHEMATICAL SCIENCES

COLLOQUIUM IN DYNAMICAL SYSTEMS

SPEAKER:

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On the Topic:

"Outer Asymptotic Solution without Matching"

In the applications of the method of matched asymptotic expansions to BVP in PDE, it is often difficult to obtain the inner solution analytically for matching with the outer solution. For many problems in mechanics, only the outer solution is of primary interest. It is desirable then to have a method to assign a portion of the boundary data to the outer solution without any reference to the corresponding inner solution. By way of a reciprocity relation, the "method of decaying residual solution" has been developed to accomplish this task for self-adjoint problems, and subsequently extended to non-self-adjoint problems as well.

The present talk will use the simple example of steady state temperature in a rectangle to illustrate the general method of decaying residual solution. It will then be applied to the Saint-Venant type torsion problems in elasticity theory. An expression of the angle of twist will be obtained in terms of stress, displacement or mixed data at the two ends of a slender cylindrical body. The results for stress end data confirm the well known Saint-Venant solution while results for other types of end data are not accessible analytically by other means.

Application of the method to axisymmetric bending of circular plates shows that "Saint-Venant's principle" is inappropriate for thick plate problems.

Friday, April 30, 1993

3:30 pm, room 3018

at

The Fields Institute

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