Institute for Advanced Study

Mathematics Seminar

Numerical Solution of Non-Smooth Eigenvalue Problems from Visco-Plasticity

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Abstract

The modeling and simulation of some visco-plastic flows involve some constants. Some of these constants are associated with Poincaré and Korn inequalities and as such are solutions of linear eigenvalue problems. On the other hand some other constants (associated with Nirenberg-Strauss inequalities) can be viewed as solutions of non-smooth eigenvalue problems of the form

$$\lambda\mu \in A(\mu)$$

where $A(.)$ is a multi-valued operator, typically the subgradient of a non-differentiable convex functional. In this lecture we will discuss the computation of λ by a methodology relying on finite element approximations and operator-splitting techniques. The results of numerical experiments will be presented leading to conjectures of mathematical interest in themselves.

About the speaker

Professor Roland Glowinski is a professor of mathematics and mechanical engineering at the University of Houston. He has been awarded the Seymour Cray Prize in France in 1988, the Grand Prix Marcel Dassault of the French National Academy of Sciences in 1996, and the SIAM Von Kármán Prize in 2004.

Professor Glowinski is an honorary doctor of the University of Jyväskylä in Finland and a member of the French National Academy of Sciences, the French National Academy of Technology and the Academia Europaea. His scientific interests include computational fluid dynamics, non-smooth mechanics, the control of distributed parameter systems, large scale optimization and the computational aspects of the calculus of variations, and more recently, computational methods for fully nonlinear elliptic equations such as Monge-Ampàre's, Pucci's etc.