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RR 99-01

Identification de contraintes dans une zone de contact: Cas axisymétrique

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Abstract : Dans le cadre du contact entre un poincon rigide et un massif élastique semi-infini, on s'intéresse au problème inverse d'identification de distribution de contraintes dans la zone de contact, non accessible à la mesure, au moyen de mesures de déplacements et de déformation de la surface libre du masif. On introduit une formulation intégrale reliant les contraintes dans la zone de contact au déplacement d'un ponit de la surface libre. En s'appuyant sur cette relation, on se propose de reconstruire , pour une zone de contact circulaire soumise à un chargement axisymtrique, le champ de contraintes dans la zone de contact à partir de mesures du déplacement normal et de la déformation radiale et orthoradiale de la surface libre. Cette relation étant fournie par une équation intégrale de Fredholm de première espèce, elle conduit à un problème inverse mal posé que nous avons régularisé de deux manières différentes. La méthode d'identification a ́té validé numriquement dans le cas d'un contact Hertizien avec frottement de Coulomb

Keywords :Mécanique de contact élastostatique, problèmes inverses, Identification de paramètres, rgularisation.
AMS subject classification :

RR 99-02

Identification of Robin coefficients by the means of boundary measurements

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Abstract : We consider the problem of determining the Robin coefficient of some specimen material, by performing measurements on some part of the boundary. An identifiability result is proved, for Robin coefficients which are continuous functions with some negative lower bound. Both a local and an almost global Lipschitz stability results are established. Finally, a cost function turning the inverse problem into an optimization one is proposed for numerical purposes. This function, which may be viewed as an energetic least squares one, has an easy-to-compute G-derivative, which encourages us considering to implement the gradient algorithm in forthcoming numerical experiments.

Keywords : Identification of parameters, Identifiability, Local Lipschitz Stability, Global Stability, identification, Energetic least squares.
AMS subject classification :

RR 99-03

Reciprocity gap and cracks identification algorithms

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Abstract : This paper focuses on the recovering of line segmant cracks from overspecified boundary data. Using the reciprocity gap principle, initially introduced in [**?**], we derive a quasi-explicit method, that is a method which does not require solving the forward problem, to reconstruct buried and emerging cracks in a homogenious material and an interfacial crack in the case of a bimaterial.

Keywords : cracks detection, inverse problems, quasi-explicit methods
AMS subject classification : 65N21, 41A29, 68W25

RR 99-04

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Abstract : We present in this paper a derivative result of tne Neumann tangentiel problem posed in a two dimension manifold pacaging a regular related fracture. We appear the shape derivative of a quadratic functional cost as a limit of a jump through the crack. That is why we introduce a family on envelopes surrounding the fracture which enable us to relax certain terms and to clear up the lack of regularity which results from the presence of the fracture. We use the min-max derivation in order to ovoid deriving the state equation and to manage the crack's singularities. We therefore write the functional as a min-max form on a space undertaking the hidden boundary regularity established by the tangential extractor method.

Keywords : Laplace-Beltrami Operator, Neumann tangential, flow, fracture, envelop, Shape derivative, min-max derivative, hidden regularity, tangential extractor.
AMS subject classification :

RR 99-05

Numerical Simulation of the Wave Equation with Discontinuous Coefficients by Non-Conforming Finite Elements

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Abstract : The goal of this paper is to apply the mortar finite element method to the numerical simulation of (electromagnetic and/or acoustic) waves propagating in an inhomogeneous support. This approach allows to use meshes well adapted to the local physical parameters of the media without any conformity constraints. A complete mathematical study is supplied providing the expected optimal convergence rate. Numerical performances of such a technique, as well as its advantages, are also discussed.

Keywords : Non conforming finite element, inhomogeneous wave equation.
AMS subject classification :

RR 99-06

The high field asymptotics for degenerate semiconductors

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Abstract : The high field limit for the semiconductor Boltzmann equation with Pauli exclusion terms is inverstigated. The limit problem is shown to have a unique solution for every given density. The proof relies on a linearization procedure together with a continuation argument. The density is finally proven to converge in the high field limit towards the solution of a nonlinear hyperbolic equation.

Keywords : Kinetic equations, maximum principle, linearization, convergence rate.
AMS subject classification : 35Q99, 82C70, 58C15
