Quelques abstracts des meilleurs PFEs

Soumis par KSOURI Med Najed
26-08-2007

Quelques abstracts des meilleurs PFEs

KSOURI Mohamed
Najed (EGES)

INRIA /
Pricing des options vanilles et asiatiques sur modèle de Heston de volatilité stochastique. (http://hal.inria.fr/inria-00157141)

Ce travail permet d'apporter une solution aux problèmes d'évaluation des produits dérivés, plus précisément les options en finance de marché dont la valeur de transaction dans les marchés internationaux dépasse quotidiennement les milliards de dollars. La résolution de ces problèmes d'évaluation est basée sur les probabilités et le calcul stochastique. En effet, il est naturel de considérer que les évolutions des cours en bourse suivent des équations différentielles stochastiques dont la simulation nécessite leur discrétisation par différences finies et la génération de différents scénarios possibles. L'objectif en finance de marché étant de déterminer la valeur des produits dérivés en bourse (ou pricing), il y a donc le défi de rapidité et surtout de précision à relever. Les techniques de Monte Carlo et de quantification sont très adaptées pour résoudre ce genre de problème. Ce projet a pour but donc d'implémenter des techniques récentes de discrétisation des EDS (différences finies, marginales) et de les combiner avec plusieurs nouvelles méthodes de simulation de Monte Carlo (variables antithétiques, échantillonage préférentiel) et de quantification afin d'améliorer l'évaluation des prix. Le modèle que nous avons choisi de simuler est le modèle de Heston de volatilité stochastique, qui est un modèle certes compliqué à simuler mais très utilisé dans la pratique. Le but final de ce travail est d'étudier l'efficacité de ces méthodes selon le type de marchés (actions, taux d'intérêt, taux de change, ...) et aussi dans des cas extrêmes de grande volatilité.

OUAKAD Hassen
(MEST)

LASMAP /
Feedback Control and Nonlinear Dynamics of Microbeam Resonators

This graduation project
focuses on the control of a microbeam using feedback. The main control objective is to make the microbeam behave like a Van Der Pol or Rayleigh oscillator, which depicts attractive filtering features. In this project, a feedback control is designed for a microbeam resonator to make it behave like a one-degree-of-freedom oscillator. This control is incorporated into the nonlinear integral-partial-differential equations that govern the microbeam dynamics. The MEMS device is actuated using an electrostatic field, which is a nonlinear function of its displacement and input voltage. One part of this project reviews and explores the dynamical and filtering features of the Van Der Pol and Rayleigh oscillators. Another part develops approximate expressions for the frequency and time responses using the method of Multiple Scales. Two design cases of feedback controllers are addressed in this research: one-point and fully-distributed actuators. For each case, the modulation equations are derived, and thus, the frequency response is determined. In order to gain insight into the advantages of using feedback control for microbeam resonators, an extensive parametric study is carried out. We first examine the effects of the DC and AC voltages and structural damping on the microbeam frequency response. We also investigate how the feedback gains make microbeam resonators behave like one of the aforementioned oscillators, and thus, capture its filtering characteristics. For the implementation of the proposed feedback control, we propose the use of two electrodes on top and beneath the microbeam. The two electrodes generate the electrostatic force and control signal separately.

GHARBI Mohamed
(MEST)

A Surface
Crack in a Functionally Graded Coating Bonded to a Homogeneous Substrate under Dynamic Loading

The fracture performance
of FGM coatings on homogeneous substrate is the focus of this study. Where, we consider the problem of a surface crack in a graded coating bonded to a homogeneous substrate. The crack plane is normal to the free boundary and is parallel to the FGM material gradient. The graded layer is modeled as a nonhomogeneous elastic medium with mechanical properties varying exponentially in the depth direction. The problem is solved under the assumption of plane strain or generalized plane stress conditions. The crack is subjected to arbitrary dynamic loadings which give rise to mixed fracture modes, namely the opening mode (mode I) and the sliding mode (II). The main clue used to conduct this study is the fact that mode I and II can be uncoupled due to the fact that the crack axis is parallel to the material gradient. Assuming linear elastic fracture mechanics, the plane elasticity equations are converted analytically using integral transforms into a dual singular integral

equations. An asymptotic analysis is performed in order to extract the proper singularities from the various kernels of the integral equations. The solution of this problem can be obtained using Jacobi polynomials. Substitution of this solution into the dual integral equations yields a linear system of algebraic equations. The major outcome of the present work is a complete analytical formulation and solution of the considered edge crack problem in terms of the crack-tip stress intensity factors for both opening and sliding modes.

BEN HALIMA
Slim (SISY)

Joint Adaptive
Combining an Multi-User High Speed Downlink Scheduling

In our work, we proposed
in a first step three multiuser scheduling schemes which are combinations between the switch and examine scheme in the network layer and the joint minimum selection generalized selection combining and adaptive modulation in the physical layer. We compared their performances in terms of spectral efficiency, feedback combined and estimated paths. We have also compared their performances with other schemes and optimal ones. We demonstrate that these schemes achieve better performances in termsof spectral efficiency, feedback load and number of combined paths. However it is clear that multiuser scheduling schemes based ongranting access to the user having the best channel conditions can lead to the monopolization of the resources by a limited number ofmobiles on the detriment of the other ones, which is a deteriorating

fact for the quality of service. Based on such observation, we proposed, in a second step, an adaptation of these three multiuser scheduling schemes enabling achieve the short term fairness of access between users from one side and optimizing on the other side the time between two channel access for each one of them.