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Computational Mathematics Seminar Series

#### Hybrid Finite Element Methods for Multiscale Problems

**Alexandre Madureira, Laboratorio Nacional de Computacao Cientifica - LNCC**

Digital Media Center 1034
February 24, 2016 - 09:00 am

**Abstract:**

In this talk we discuss the use of hybrid methods for multiscale partial differential equations, in particular concerning the development of a hybrid scheme to solve the linear elasticity system. The unknowns are the displacements and the boundary tractions at each element. Starting from a primal hybrid formulation, the method has a domain decomposition flavor, and the displacements can be discontinuous, with continuous tractions. A decomposition of the primal space allows the reformulation of the continuous problem as a coupled system of elementwise equations, and a global mixed system posed on the mesh skeleton. The scheme is embarrassingly parallel, where the local problems are solved independently. We shall discuss the connections between this and some other methods.

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**Speaker's Bio:**

Alexandre Madureira completed his Ph.D. at PennState University, under the supervision of Douglas Arnold. He is now a senior researcher at Laboratório Nacional de Computação Científica-LNCC, a research lab in Brazil. During the academic year 2015-2016, he is spending a Sabbatical year at The Division of Applied Mathematics, at Brown University. Dr. Madureira plays a role in fostering the development of applied mathematics in Brazil, taking part in scientific committees and delivering lectures and short courses. He is an associate editor of the International Journal of Computer Mathematics, and also at TEMA - Tendências em Matemática Aplicada e Computacional, a journal of main Brazilian society in applied mathematics - SBMAC. He is also the Chief Editor for the Notas em Matemática Aplicada, a book series published by the SBMAC. He also served as the head of the department of Computational and Applied Mathematics at LNCC for two non-consecutive terms. His research interests involve multiscale modeling and finite element methods.

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**This lecture has a reception @ 08:30 am**

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