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CENTRO DE MATEMÁTICA E APLICAÇÕES FUNDAMENTAIS
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Mês de: JANEIRO 2015

SEMINÁRIO DE ANÁLISE E EQUAÇÕES DIFERENCIAIS

(Atenção à alteração da hora habitual do seminário)

Dia 29 de Janeiro (quinta-feira), às 14:30h, na Sala B3-01

The Adjoint Method in Optimization of Eigenvalues and Eigenmodes

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Abstract:

The Adjoint Method goes back to the works of Pontryagin in the framework of Ordinary Differential Equations. In the eighties, J. Cea employed the Adjoint Method in a practical way, from the perspective of Lagrange multipliers. Since then, applications of the Adjoint Method were successfully used in Shape Optimization, Topology Optimization and very recently to optimize eigenvalues and eigenmodes (eigenvectors). In this talk it will be shown how the Adjoint Method is applied to the optimization of eigenvalues and eigenmodes. The general case of an arbitrary cost function will be detailed. The direct problem does not involve a bilinear form and a linear form as usual in other applications. However, it is possible to follow the spirit of the method and deduce N adjoint problems and obtain N adjoint states, where N is the number of eigenmodes taken into account for optimization. An optimization algorithm based on the derivative of the cost function is developed. This derivative depends on the derivatives of the eigenmodes and the Adjoint Method allows one to express it in terms of the the adjoint states and of the solutions of the direct eigenvalue problem. This method was applied in [1] for material identification purposes in the framework of free material design. In [2] this study is applied to optimization of microstructures, modeled by Bloch wave techniques.

References

[1] S. Oliveira, A.-M. Toader, P. Vieira, Damage identification in a concrete dam by fitting measured modal parameters. Nonlinear Analysis: Real World Applications, 13, Issue 6, 2888-2899, 2012.

[2] C. Barbarosie, A.-M. Toader, The Adjoint Method in the framework of Bloch Waves (in preparation).

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