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## SEMINARIO DE ANÁLISIS NUMÉRICO Y MODELACIÓN MATEMÁTICA

Departamento de Matemática, UBB  
Centro de Investigación en Ingeniería Matemática (CI<sup>2</sup>MA), UDEC

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*Expositor:*

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*Título de la Charla:*

*A multiscale strategy and its optimization for the simulation of delamination, buckling and contact of laminated composites.*

*Fecha y Hora:*

Martes 7 de Enero de 2014, 16:00 Horas.

*Lugar:*

Auditorio Alamiro Robledo, FCFM

Universidad de Concepción.

### **Resumen**

Laminated composites are proven their worth as materials with a high strength-to-weight ratio, but the high cost of these materials can lead to use them only in specific industries. In the attempt to bring down their cost, it is essential to use numerical simulations to replace expensive experimental tests. However, the understanding of their nonlinear response raises new issues. One of the current challenges is to confront the huge size of the required Finite Element discretizations, which leads to considering parallel and multiscale computations. In previous works, we proposed a nonlinear framework for a multiscale domain decomposition method in order to simulate the interactions between delaminations and buckling in laminated composites, taking into account contact between the delaminated surfaces. To solve the problem, three scales are considered: i) the micro-scale associated with a fine discretization of each substructure, ii) the macro-scale ensuring the propagation of the high-wavelength part of the solution and iii) the supermacro-scale solving the macro-scale problem. This talk presents the formulation used and discusses the enhancements to the iterative process in order to ensure the rapid convergence and the scalability of the method. These results are based on joint work with O. Allix and P. Gosselet (LMT-Cachan, France).

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