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# SEMINARIO DE ANÁLISIS NUMÉRICO Y MODELACIÓN MATEMÁTICA

GIMNAP-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:*

*Linear unconditional energy-stable splitting schemes  
for a phase-field model for nematic-isotropic flows  
with anchoring effects*

**Fecha y Hora:**

**Martes 10 de Mayo de 2016, 15:30 Horas.**

**Lugar:**

**Auditorio Alamiro Robledo, FCFM**

**Universidad de Concepción.**

## **Resumen**

Two-phase flows composed of fluids exhibiting different microscopic structure are an important class of engineering materials. The dynamics of these flows are determined by the coupling among three different length scales: microscopic inside each component, mesoscopic interfacial morphology and macroscopic hydrodynamics. Moreover, in the case of complex fluids composed by the mixture between isotropic (newtonian fluid) and nematic (liquid crystal) flows, its interfaces exhibit novel dynamics due to anchoring effects of the liquid crystal molecules on the interface. In this talk I will introduce a new differential problem to model mixtures composed by isotropic fluids and nematic liquid crystals, taking into account viscous, mixing, nematic, and anchoring effects and reformulating the corresponding stress tensors in order to derive a dissipative energy law. Then, I will present two new linear unconditionally energy-stable splitting schemes that allows us to split the computation of the three pairs of unknowns (velocity-pressure, phase field-chemical potential and director vector-equilibrium) in three different steps. Finally, I will present several numerical simulations in order to show the efficiency of the proposed numerical schemes and the influence of the different types of anchoring effects in the dynamics of the system. This contribution is based on joint work with Francisco Guillén-González (Universidad de Sevilla, Spain) and María Ángeles Rodríguez-Bellido (Universidad de Sevilla, Spain).