Seminario de Matemática Aplicada

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"Footballs, phase changes and nanotubes: practical applications of mathematics"

In this talk I will briefly discuss a number of applied mathematics research topics currently under investigation at the CRM.

1. Football motion through the air. This project came from a question posed by a South African premiership team. Simply put the question was, "can we choose a football that will disadvantage a visiting team". The answer was yes and the teams results improved significantly after this work was completed.

2. Phase change. The mathematical description of the change of phase of a substance, for example from liquid to solid, is well established. However, in certain situations the standard formulations break down. I will describe our recent work on the melting of nanoparticles and solidification of a supercooled liquid (supercooled liquids are currently exploited to make materials with with unique propertieS.

3. Flow in carbon nanotubes. Carbon nanotubes are viewed as one of the most exciting new materials with applications in electronics, optics, materials science and architecture. One unusual property is that liquid flows through nanotubes have been observed up to five orders of magnitude faster than predicted by classical fluid dynamics. I will describe a model for fluid flow in a CNT and show that the theoretical limit is closer to 50 times the classical value. This result is in keeping with later experimental and molecular dynamics papers.

4. Nanofluid flows. If time permits (and we have the necessary results) I will briefly discuss our recent work on the use of nanofluids as a new generation of coolants.

14 de junio de 2012 a las 12:00 hs.
Seminario Alberto Dou (sala 209)
Facultad de CC Matemáticas, UCM