



Berlin  
Mathematical  
School

## BMS Friday Colloquium

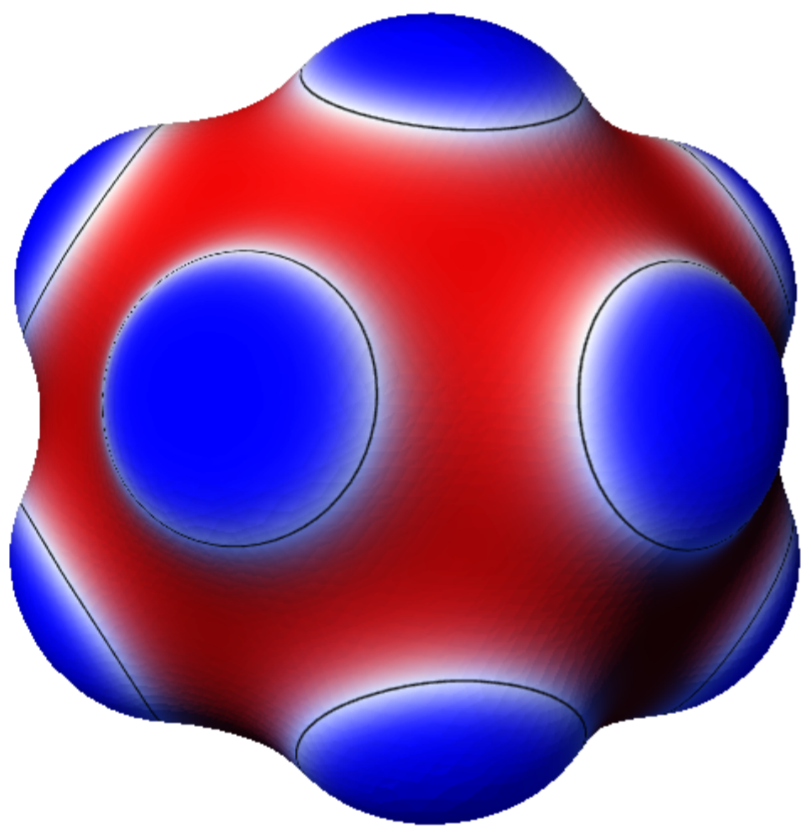
**Friday 21 October 2011 at 14:15**

*Tea before the lecture begins at 13:00*

BMS Loft, Urania, An der Urania 17, 10787 Berlin

### Charles M. Elliott

*(University of Warwick)*



#### Evolving interfaces and surfaces

The topics of this talk lie at the interfaces between mathematical modeling, mathematical analysis and scientific computation. In particular it will be concerned with models in biology and material science for processes which determine complex evolving morphology for surfaces and interfaces. For example, we have in mind the equilibrium shapes of two phase geometric biomembranes, cell motility and chemotaxis and the formation of nanoporosity in binary alloys via surface dissolution.

Charles M. Elliott will show how the Leibniz-Reynolds transport formula for evolving hypersurfaces may be used to

- determine geometric evolution laws for surfaces such as mean curvature, Willmore and Helfrich flow,
- derive conservation laws for surface quantities such as the diffusion/heat equation on a moving hypersurface and
- define conservative numerical methods for PDEs on moving hypersurfaces such as the evolving surface finite element method.

The talk will be illustrated by experimental and computational videos and images.

Professor Charles M. Elliott gained worldwide reputation for his outstanding contributions to the analysis and numerical analysis of non-linear partial differential equations. He proved first existence and uniqueness results, developed and analyzed new numerical schemes and also applied his theoretical results to practically relevant problems from material science, fluid dynamics, theoretical biology and others.