



Berlin
Mathematical
School

BMS Friday Colloquium

Friday 9 December 2011 at 14:15

Tea before the lecture begins at 13:00

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

James Sethian

(University of California, Berkeley)



Advances in Advancing Interfaces: Efficient Algorithms for Inkjet Plotters, Coating Rollers, Semiconductors, Retinopathy Diagnosis, and Chemical Pathway Analysis

Propagating interfaces occur in a wide variety of settings, and include ocean waves, burning flames, and material boundaries. Less obvious boundaries are equally important, and include iso-intensity contours in images, handwritten characters, and shapes against boundaries. In addition, some static problems can be recast as advancing fronts, including robotic navigation and finding shortest paths on contorted surfaces.

One way to frame moving interfaces is to recast them as solutions to fixed domain Eulerian partial differential equations, and this has led to a collection of PDE-based techniques, including level set methods, fast marching methods, and ordered upwind methods. These techniques easily accommodate merging boundaries and the delicate 3D physics of interface motion. In many settings, they have been proven valuable.

In this talk, James Sethian will focus on scientific and engineering applications of these techniques. This will include "How do home inkjet plotters work?". "What happens at the subscale when bubbles collapse?". "How can we guide chemical probes through complex materials?". "How are semiconductors built?". And, "How can we automate the early detection of eye disease?".

James Sethian is a professor of mathematics at the University of California, Berkeley, and the head of the Mathematics Group at the Lawrence Berkeley National Laboratory.

In 2011 and 2012, James Sethian is an 'Einstein Visiting Fellow' at the BMS.