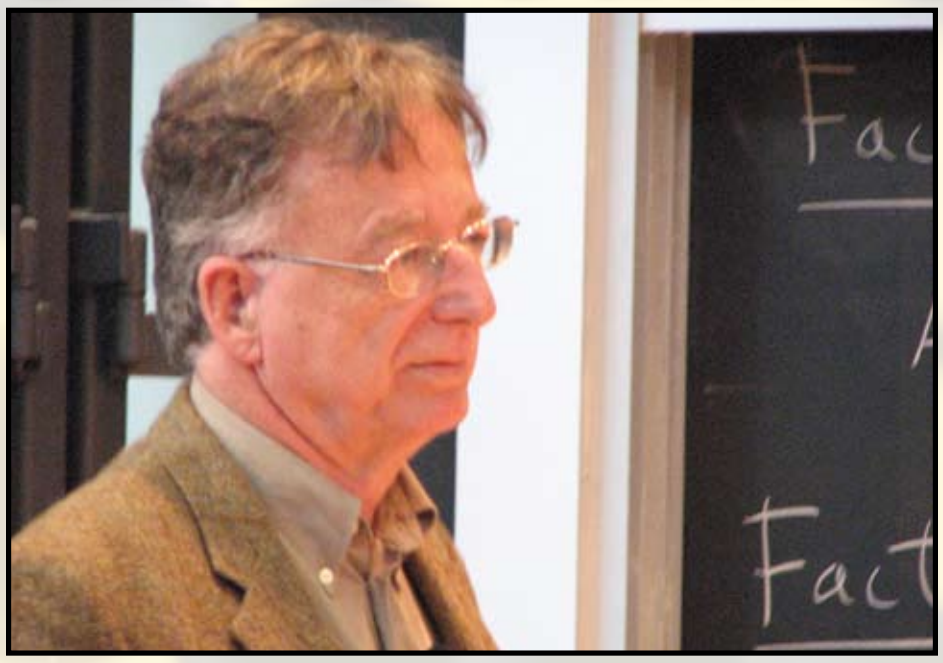
Center for Applied Mathematical Sciences
Distinguished Lecture Spring 2011

Dennis Sullivan



Correlated finite energy models of Navier Stokes time evolution

Abstract: If one has an AT (Algebraic Topology) model of a system of fields and operations in Riemannian geometry, there is a natural way to construct derived models at each scale of resolution. In addition there are transition mappings between these derived models at different scales.The process of constructing derived models is based on the key idea of AT: chain homotopy equivalences between chain complexes.

If a nonlinear PDE among the original system of fields and operations can be reformulated in the derived models, one can obtain a system of finite energy or finite scale models which are correlated by structure mappings.

Incompressible Navier Stokes evolution in 3D can be described by the differential algebra of differential forms, the Hodge star operator and the projections of the Hodge decomposition. These objects are naturally interpreted in AT.

The lecture will discuss this AT approach to deriving computational fluid models.

Monday March 7, 2011
Kaprielian Hall, Room 414

Reception: 3:00-3:30 pm
Kaprielian Hall, Room 410

Lecture: 3:30-4:30 pm

CAMS Director:
Susan Friedlander
susanfri@usc.edu

USC

Dennis Sullivan holds the Albert Einstein Chair at the CCNY Graduate Center and is also a professor at SUNY Stony Brook. He received his PhD from Princeton University in 1966. His thesis, Triangulating Homotopy Equivalences was a major contribution to surgery theory. He was a profesor at MIT and then a permanent member of the Institut des Hautes Etudes Scientifiques in France from 1974 to 1997.

Sullivan has made fundamental contributions to many areas, especially in algebraic topology and dynamical systems. He developed new perspectives on localisation in algebraic topology with applications to the Adams conjecture, rational homotopy theory and the classification of homotopy types. His work on topological field theories and the formalism of string theory can be viewed as a byproduct of his quest for an ultimate understanding of the nature of space, and how it can be encoded in algebraic structures. His recent work lies at the interface of topology, dynamics, geometry and nonlinear PDE.

Sullivan's many honors and awards include the Wolf Prize, the Steele Prize, the Veblen Prize, the Cartan Prize, the King Faisal Prize and the National Medal of Science. He is a member of the National Academy of Sciences and the American Academy of Arts and Sciences.