Fall 2009 COLLOQUIUM SERIES

GRANULAR AND MULTIPHASE FLOWS

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The Granular Science Laboratory

Prof. Williams O. Williams

Department of Mathematical Sciences

Carnegie Mellon University

Pittsburgh, PA

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11:30 a.m. – 1:00 p.m.

Mechanical Engineering Center - Room 224

Mechanics of Tensegrity Structures

Following sculptures created by Snelson in 1948, in 1961 Buckminster Fuller patented a class of cable-bar structures which he called tensegrity structures. These consisted of arrangements with bars in compression, no two connected directly, with structural integrity maintained by the tension in the connecting cables. Hence ``tension- integrity'', compressed to ``tensegrity''. These structures, remarkable to Fuller for enclosing large volumes of space with minimal weight, are not as well known as his corresponding shell constructions, but offer interest both mathematically and for engineering usage.

The study of these structures remained in the hands of artists and architects until the seventies, when analyses of a generalized form of tensegrity structures appeared in both the mathematical and the engineering literature. The name ``tensegrity structure'' was extended to include any class of pin-connected frameworks in which some of the frame members are cables. In these days, one often finds the theory of classical mechanisms included under this rubric.

A remarkable thing about the theory of these structures is how little there is of a general sort: general results are few and unsystematic. In this talk, I will discuss some of these results and also the more practical "form-finding" problem.

Professor Williams received an MS in Mechanical Engineering from Rice University and a PhD in Applied Mathematics from Brown University. He has been at Carnegie Mellon University since finishing his education, progressing through the ranks and serving in several administrative positions. His long-term work has been in general continuum mechanics, and he has done work in mechanics of structures and in biological mechanics.

For further information, please contact Dr. A. Rosato, ME Department (rosato@njit.edu; 973-596-5829)

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