

# AEROSPACE & MECHANICAL ENGINEERING



**2011 COLLOQUIUM 2012  
SEMINARS ARE OPEN TO THE PUBLIC**

**INFORMAL COFFEE PERIOD BEFORE THE SEMINAR IN ROOM 365 FITZPATRICK HALL  
UNIVERSITY OF NOTRE DAME, NOTRE DAME, INDIANA 46556**

**SPEAKER: Professor L. B. Freund**  
Department of Materials Science & Engineering  
University of Illinois at Urbana-Champaign  
Urbana, Illinois

**TOPIC: CONSTRAINT FORCES ON SMALL ELASTIC BIO-STRUCTURES  
INDUCED BY RANDOM THERMAL FLUCTUATIONS**

**DATE:** Tuesday, March 20, 2012

**TIME:** 3:30 p.m.

**PLACE:** 138 DeBartolo Hall

## ***ABSTRACT***

Small biological structures in the form of condensates of bio-molecules are often idealized as elastic structural elements constrained by their surroundings. For example, an actin filament might be treated as a beam with end constraints or a cell membrane might be treated as a plate/shell with edge constraints. Furthermore, these structures commonly fulfill their biological functions in a water environment at a temperature on the order of 30C and, consequently, they experience thermal fluctuations due to Brownian motion. The forces of constraint are indeed small in magnitude when considered in the context of structural mechanics, but these constraints must be maintained by relatively weak molecular bonds. In this lecture, we will discuss probabilistic methods for estimating the magnitudes of such constraint forces induced by random thermal fluctuations, within the framework of equilibrium statistical mechanics.

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**NOTE:** *If you are interested in meeting individually with  
Prof. Freund, please contact Evelyn at 631-5431*