Existence and dynamic properties of a parabolic nonlocal MEMS equation

Kin Ming Hui
December 7 - 11, 2009

Institute of Mathematics, Academia Sinica,
Nankang, Taipei, 11529, Taiwan, R. O. C.
e-mail: kmhui@gate.sinica.edu.tw

Abstract

Micro-electromechanical systems (MEMS) are widely used nowadays in many electronic devices including accelerometers for airbag deployment in cars, inkjet printer heads, and the device for the protection of hard disk, etc. The challenge is to build and understand the mathematical models and the mechanism for the various MEMS devices. In this talk we will prove various properties of the parabolic nonlocal MEMS equation

\[ u_t = \Delta u + \frac{\lambda}{(1-u)^2} (1 + \chi \int_{\Omega} \frac{1}{1-u} \, dx)^2 \]

in \( \Omega \times (0, \infty) \), \( u = 0 \) on \( \partial \Omega \times (0, \infty) \), \( u(x,0) = u_0 \) in \( \Omega \), including the existence of global solution, pull-in voltage estimates, asymptotic behaviour of solutions and quenching behaviour of solutions.

References


