

Department of Mathematics  
City University of Hong Kong

## Colloquium

Organised by Prof. Tong YANG and Dr Xianpeng HU

### Multistability in Confined Nematic Systems

by

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#### **Abstract :**

Nematic liquid crystals are classical examples of mesogenic materials that are intermediate in physical character between solids and conventional liquids. Nematic liquid crystals exhibit a degree of long-range orientational order i.e. there are locally preferred directions of averaged molecular alignment referred to as "directors". We briefly review two popular continuum theories for nematic liquid crystals: the Oseen-Frank theory for uniaxial nematics with constant order and the Landau-de Gennes theory which can account for uniaxiality, biaxiality and variable order. We model two multistable systems: annular chambers filled with fd-viruses or nematic-like materials and nematic-filled square chambers. Both systems are multistable in the sense that they can support multiple stable equilibria, in some cases stabilised by interior and boundary defects, as a function of the geometry, boundary conditions and temperature. We compare the Oseen-Frank and Landau-de Gennes results in both cases and give examples of new stable spatial patterns captured by the Landau-de Gennes theory, outside the scope of the Oseen-Frank approach. We use a combination of methods from calculus of variations, singular perturbation theory, bistable reaction diffusion equations and powerful numerical methods for partial differential equations. This is joint work with a number of collaborators who will be acknowledged throughout the talk.

**Date:** 7 April 2018 (Saturday)  
**Time:** 4:30 – 5:30pm  
**Venue:** Y5-304, Yellow Zone, Floor 5, Yeung Kin Man  
Academic Building (AC1)  
City University of Hong Kong

**\*\* All interested are welcome \*\***

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