

Department of Civil Engineering and Engineering Mechanics
Columbia University

**Developments in Extended Finite Element
Methods for Extraction of Strain Energy Release
Rates and Computational Nanomechanics for
SWCNT Aggregates**

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April 10, 2013 (Wednesday)
Time: 2:30 pm - 3:30 pm
Location: 834 Mudd

A new analytical approach, within the extended finite element (XFEM) framework, is proposed to compute Strain Energy Release Rates (SERRs) directly from Irwin's integral. Crack tip enrichment functions in XFEM allow for evaluation of integral quantities in closed form (for some crack configurations studied) and therefore results in an accurate and efficient method. The effects of high order enrichments, mesh refinement and the integration limits of Irwin's integral are examined in benchmark numerical examples. The results indicate that high order enrichment functions have significant effect on the convergence, in particular when the integral limits are finite. When the integral limits tend to zero, simpler SERR expressions are obtained and high order terms vanish. Nonetheless, these terms contribute indirectly via coefficients of first order terms.

Biography: Mengyu Lan is a PhD Candidate at Department of Civil Engineering and Engineering Mechanics of Columbia University. Having obtained a diploma and masters' degree from Tsinghua University of China, he joined the CEEM Department in 2009. His PhD advisor is Professor Haim Waisman.