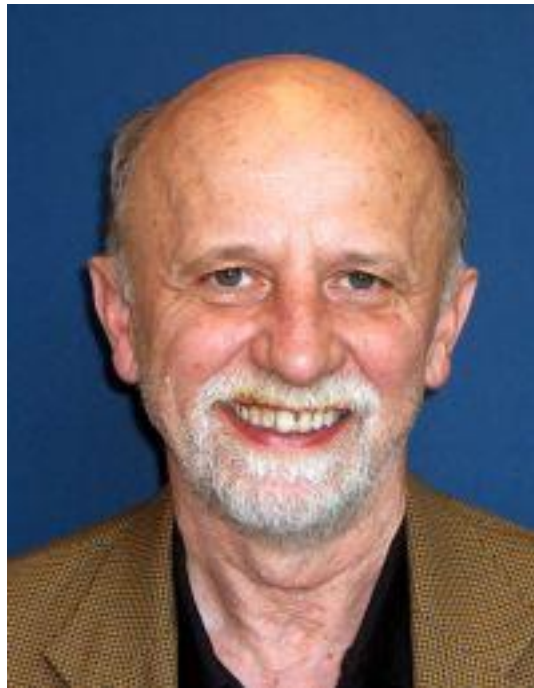


**NU2013 Spring Workshop:**

**Advances in Computational Mechanics with Emphasis on Fracture  
and Multiscale Phenomena**

**April 18 -April 20, 2013**

**Evanston, IL**



**The workshop is in honor of  
Professor Ted Belytschko's 70th Birthday**

Dear Friends and Colleagues,

We would like to welcome you to the NU2013 Spring workshop in honor of Professor Ted Belytschko's 70th birthday, which will be held in the beautiful city of Evanston, IL from April 18 - April 20, 2013.

Professor Belytschko's seminal work in Computational Mechanics with numerous contributions over the past few decades have significantly shaped this field and have influenced our lives.

This workshop will be a great event with a special focus on fracture and multiscale phenomena and many other related topics in computational mechanics.

The final program is shaping up to be quite interesting!

We are looking forward to seeing you soon.

With our warmest regards,

The organizing committee:

[Haim Waisman](#) (Columbia University)

[Jacob Fish](#) (Columbia University)

[JS Chen](#) (University of California, Los Angeles)

[Wing Kam Liu](#) (Northwestern University)

Workshop administrative assistant:

Nancy Flannery (Northwestern University)

# Advances in Computational Mechanics with Emphasis on Fracture and Multiscale Phenomena workshop honoring Professor Ted Belytschko's 70th Birthday.

APRIL 18, 2013 - APRIL 20, 2013

## Workshop Technical Program

updated on 04/10/2013

### Thursday, April 18, 2013

- 5:30 pm – 6:30 pm *Host bar*
- 6:30 pm - 7:00 pm *Speeches given by Jacob Fish, Thomas J. R. Hughes and Tinsley Oden  
(per Ted Belytschko's request)*
- 7:00 pm - 8:45 pm *sit-down reception dinner*

### Friday, April 19, 2013

- 7:00 am - 8:00 am *Breakfast*
- 8:00 am - 8:15 am *Welcome Notes*

#### Session 1: Multiscale Methods

- 8:15 am - 8:25 am Tinsley Oden Validation of Multiscale Models of Complex Systems
- 8:25 am - 8:35 am Somnath Ghosh Multi-scale Modeling of Metals and Composites in Spatial and Temporal Domains:  
Addressing the ICMSE Initiative
- 8:35 am - 8:45 am Jacob Fish Practical Multiscale Modeling
- 8:45 am - 8:55 am Jeffrey Paci A quantum mechanics/continuum mechanics method applied to the study of graphene  
Fracture
- 8:55 am - 9:05 am Isaac Daniel Multiscale Analysis of Progressive Failure of Composite Structures
- 9:05 am - 9:15 am Yuri Bazilevs Advances in Isogeometric Structural Mechanics and FSI
- 9:15 am - 9:25 am Dong Qian A Multi-temporal Scale Approach using Extended Space-Time Finite Element Method
- 9:25 am - 9:35 am Caglar Oskay Multiscale Spatio-Temporal Modeling of Fatigue Failure in Composites
- 9:35 am - 9:45 am Sheldon Wang Multi-Scale and Multi-Physics Modeling of Proteins and Cells – A Computational Protocol  
for Complex Systems
- 9:45 am - 9:55 am Su Hao Phase Field Simulation of Polycrystalline Dynamics Based on a Dislocations-Introduced  
Grain Boundary Model

#### 9:55 am - 10:15 am Discussion. Co-Chairs: Somnath Gosh and Jacob Fish

- 10:15 am - 10:30 am *Coffee Break*

#### Session 2: Mechanics of Materials

- 10:30 am - 10:40 am Zdeněk Bažant Scaling of Probability Distributions of Strength and Lifetime of Quasibrittle Structures
- 10:40 am - 10:50 am Alan Needleman Porosity Evolution and the Thickness Debit Effect in Superalloy Single Crystals
- 10:50 am - 11:00 am Horacio Espinosa 10 Years of Progress in Nanomechanical Testing

11:00 am - 11:10 am	L Cate Brinson	Mechanics of Nano-Confined Polymers
11:10 am - 11:20 am	Brian Moran	Large deformations near a crack tip in a fiber-reinforced Neo-Hookean sheet
11:20 am - 11:30 am	Jean-Philippe Ponthot	A Thermomechanically Implicit Coupled Approach for Damage and Crack Propagation
11:30 am - 11:40 am	Yonggang Huang	Modeling of Dissolvable Electronics
11:40 am - 11:50 am	Oana Cazacu	Effects of single crystal plastic deformation mechanisms on the dilatational plastic response and void growth of porous polycrystals
11:50 am - 12:00 pm	Marino Arroyo	Mechanics of confined thin films, solid (graphene) and fluid (lipid bilayers)
12:00 pm - 12:10 pm	Jan Achenbach	A New Use of the Elastodynamic Reciprocity Theorem

**12:10 pm - 12:30 pm Discussion. Co-Chairs: Horacio Espinosa and Yonggang Huang**

12:30 pm - 2:00 pm *Lunch Break*

**Session 3: The Extended Finite Element Method**

2:00 pm - 2:10 pm	John Dolbow	On eXtended Finite Element Methods for Crack Closure
2:10 pm - 2:20 pm	David Benson	X-FEM in Isogeometric Analysis for Linear Fracture Mechanics
2:20 pm - 2:30 pm	Giulio Ventura	Quadrature techniques for enrichment functions in XFEM: Recent results on the Equivalent Polynomial approach
2:30 pm - 2:40 pm	Isaac Harari	Extracting Strain Energy Release Rates from Irwin's integral using higher-order functions in XFEM
2:40 pm - 2:50 pm	Zhanli Liu	XFEM modeling of ultrasonic wave propagation in polymer matrix particulate/fibrous composites
2:50 pm - 3:00 pm	Armando Duarte	Analysis of 3-D Fractures: A Non-Intrusive Approach Using a Two-Scale Generalized/eXtended Finite Element Method
3:00 pm - 3:10 pm	Mark Fleming	Fatigue Fracture Analysis using XFEM Combined with Fracture Surface Analysis
3:10 pm - 3:20 pm	Qingda Yang	An Efficient Augmented Finite Element Method (A-FEM) for Arbitrary Cracking and Crack Interaction in Solids
3:20 pm - 3:30 pm	Haim Waisman	A Spline Based Enrichment Function for Arbitrary Inclusions in XFEM with Applications to Finite Deformations

**3:30 pm - 3:50 pm Discussion. Chair: John Dolbow and Armando Duarte**

3:50 pm - 4:05 pm *Coffee Break*

**Session 4: Computational Methods in Engineering**

4:05 pm - 4:15 pm	Thomas J.R. Hughes	The Chicken and Egg Problem of Computational Mechanics
4:15 pm - 4:25 pm	Leon Keer	Some Contact Problems Showing the Influences of Inhomogeneities
4:25 pm - 4:35 pm	Petr Krysl	Finite element elasticity of anisotropic materials with single-quadrature-point hexahedra, selective reduced integration and nodal-integration stabilization
4:35 pm - 4:45 pm	Adrian Lew	Universal Meshes for the Simulation of Hydraulic Fractures
4:45 pm - 4:55 pm	Elisa Budyn	Identification of physical fields in biological tissues
4:55 pm - 5:05 pm	Henryk Stolarski	Effects of surface elasticity and surface stresses in composites
5:05 pm - 5:15 pm	Sulin Zhang	In Situ Lithiation Mechanics of Silicon

5:15 pm - 5:25 pm	Shaofan Li	Multiscale crystal defect dynamics: a process zone approach
5:25 pm - 5:35 pm	Robert Gracie	Hydraulic Fracture with XFEM
5:35 pm - 5:45 pm	Harold Park	Multi-Timescale Approaches to Investigate Plasticity in Amorphous Solids

**5:45 pm - 6:05 pm Discussion. Chair: Petr Krysl and Isaac Harari**

6:05 pm - 7:15 pm	<i>Break</i>	
7:15 pm - 7:45 pm	<i>Speeches given by L Cate Brinson, Jan Achenbach and Wing Kam Liu (per Ted Belytschko's request)</i>	
7:45 pm - 9:15 pm	<i>Banquet Dinner</i>	

**Saturday April 20, 2013**

7:00 am - 8:15 am *Breakfast*

**Session 5: Multiscale Methods in Fracture Mechanics**

8:15 am - 8:25 am	Charbel Farhat	Dynamic implosion of submerged structures: numerical simulations and experiments
8:25 am - 8:35 am	Marc Geers	Interfacial crack propagation: enriched schemes & multi-scale challenges
8:35 am - 8:45 am	Joseph Rencis	Nanoscale Fracture in Graphene
8:45 am - 8:55 am	Nicolas Moës	The Thick Level Set model : an efficient theoretical and numerical localization limiter for strain softening in dynamics
8:55 am - 9:05 am	Arif Masud	A Discontinuous/Continuous Galerkin Method for Modeling of Interphase Damage in Fibrous Composite Systems
9:05 am - 9:15 am	Franck Vernerey	A concurrent adaptive multiscale methodology for fracture in heterogeneous media
9:15 am - 9:25 am	Karel Matous	High performance three-dimensional multiscale modeling of failure in heterogeneous adhesive layers
9:25 am - 9:35 am	Robert Mullen	Probability bounds analysis non-linear structures
9:35 am - 9:45 am	Antonio Huerta	Parametric solutions involving geometry: a step towards efficient shape optimization
9:45 am - 9:55 am	Varvara Kouznetsova	Multi-scale modelling of fracture: a continuous-discontinuous computational homogenization approach

**9:55 am - 10:15 am Discussion. Co-Chairs: Marc Geers and Nicolas Moës**

10:15 am - 10:30 am *Coffee Break*

**Session 6: Particle Methods**

10:30 am - 10:40 am	Eugenio Oñate	Advances in the particle finite element method (PFEM) for particulate flows in engineering
10:40 am - 10:50 am	J. S. Chen	Meshfree Method for Shock Modeling
10:50 am - 11:00 am	N. Sukumar	Meshfree Methods: From Element-Free Galerkin to Maximum-Entropy Schemes
11:00 am - 11:10 am	Qinglin Duan	Quadratically consistent integration schemes for meshfree Galerkin methods

<b>11:10 am - 11:20 am</b>	Rebecca Brannon	Deformation and Fracture of Heterogeneous Media using Boundary-Conforming Conected Particle Characteristic Functions in the Material Point Method
<b>11:20 am - 11:30 am</b>	Young-Cheol Yoon	The Extended Particle Difference Method for Solving Free Boundary Problems
<b>11:30 am - 11:40 am</b>	Yan Liu	Microstructure Model for Carbon Nanotube Reinforced Composites Based on Material Point Method
<b>11:40 am - 11:50 am</b>	Gianluca Cusatis	Computational modeling of projectile penetration into fiber reinforced ultra-high-performance concrete slabs
<b>11:50 am - 12:00 pm</b>	Sia Nemat-Nasser	Interaction of a Shock Wave with Elastically Constrained Periodic Obstacles: Estimates and Visualization
<b>12:00 pm - 12:20 pm</b>	<b>Discussion. Co-Chairs: J.S. Chen and N. Sukumar</b>	
<b>12:20 pm -</b>	<i>Adjournment</i>	