Nonlocal Models in Mathematics, Computation, Science, and Engineering
Oak Ridge National Laboratory
Program

Sunday, October 25, 2015
DoubleTree Hotel, Salon C, Oak Ridge, TN
16:00 – 18:00  Registration
17:00 – 19:00  Reception

Monday, October 26, 2015
All talks will take place in JICS Auditorium; all breaks, lunches, and the poster sessions will take place in JICS Lobby
7:45  Bus departs from DoubleTree Hotel to ORNL
8:15 – 8:45  Registration
8:45 – 9:00  Welcoming Remarks
  J. Nichols, ORNL Assoc. Lab. Director for Computing & Computational Sciences
  B. Maccabe, Director, ORNL Computer Science and Mathematics Division
9:00 – 10:00  S. Silling, Sandia National Laboratories. Survey Talk
  “Predictivity in Fracture Modeling”
10:00 – 10:30  Coffee break
10:30 – 11:00  J.N. Reddy, Texas A&M University
  “On a Unified Integro-Differential Nonlocal Model for Solid Mechanics Problems”
11:00 – 11:30  R. Lehoucq, Sandia National Laboratories
  “Nonlocal Constitutive Relations”
11:30 – 12:00  E. Madenci, University of Arizona
  “Peridynamic Differential Operator for the Solution of Linear and Nonlinear Differential Equations”
12:00 – 12:30  F. Bobaru, University of Nebraska-Lincoln
  “Dynamic Fracture in Functionally Graded Materials with Peridynamics”
12:30 – 14:00  Lunch
14:00 – 15:00  D. del-Castillo-Negrete, Oak Ridge National Laboratory. Survey Talk
  “Nonlocal Transport: Physics Basis and Applications”
15:00 – 15:30  I. Podlubny, Technical University of Kosice, Slovak Republic
  “Fractional Calculus for Applications: Some Aspects of Problem Formulation, Solution, and Interpretation”
15:30 – 16:00  M. Meerschaert, Michigan State University
  “Nonlocal Diffusion on Bounded Domains”
16:00 – 16:30  Coffee break
16:30 – 17:00  D. Turner, Sandia National Laboratories
  “Nonlocal Digital Image Correlation”
17:00 – 17:30  A. Zemlyanova, Kansas State University
  “Curvature-Dependent Surface Tension in Contact Problems and Fracture Mechanics”
17:30 – 18:45 Poster Session A - Reception
A.1 H. Antil, George Mason University
"Fractional Space-Time Optimal Control Problems: Analysis and Discretization"
A.2 S. Bond, Sandia National Laboratories
"A Finite Element Method for the Weak Formulation of Nonlocal Mechanics"
A.3 T. Costa, Oregon State University
"Peridynamic Multiscale Finite Element Method"
A.4 M. D'Elia, Sandia National Laboratories
"A Coupling Strategy for Nonlocal and Local Diffusion Models with Mixed Volume Constraints and Boundary Conditions"
A.5 P. Diehl, University of Bonn, Germany
"Simulation of Crack Tip Instabilities Using Bond-Based Peridynamics"
A.6 Q. Guan, Florida State University
"θ Schemes for Finite Element Discretization of the Space-Time Fractional Diffusion Equations"
A.7 W. Jamieson, University of Nebraska-Lincoln
"Numerical and Theoretical Analysis of Nonlocal Diffusion Models"
A.8 Q. Le, University of Nebraska-Lincoln
"Surface and Interface Effects in Peridynamics"
A.9 J. Mitchell, Sandia National Laboratories
"Ordinary, Isotropic Constitutive Models for Peridynamics"
A.10 J. Suzuki, University of Campinas, Brazil
"Fractional-Order Uniaxial Visco-Elasto-Plastic Models for Structural Analysis"
A.11 L. White, University of Nebraska-Lincoln
"Energy Identity and Decay Estimates for Nonlocal Wave Equations"
A.12 Y. Zhang, Missouri University of Science and Technology
"Eigenvalues and Eigenfunctions of the Fractional Laplacian and their Applications to the Fractional Quantum Mechanics"

19:00 Bus departs from ORNL to DoubleTree Hotel
Dinner (on your own)
Tuesday, October 27, 2015

8:00  Bus departs from DoubleTree Hotel to ORNL
8:30 – 9:00  Registration
9:00 – 10:00  M. Gunzburger, Florida State University. Survey Talk
  “Integral Equation Modeling for Nonlocal Diffusion and Mechanics”
10:00 – 10:30  Coffee break
10:30 – 11:00  R. Lipton, Louisiana State University
  “Cohesive Dynamics and Quasi-Brittle Fracture”
11:00 – 11:30  P. Radu, University of Nebraska-Lincoln
  “Diffusion Phenomenon for Local and Nonlocal Models”
11:30 – 12:00  B. Aksoylu, TOBB University of Economics and Technology, Turkey
  “Incorporating Local Boundary Conditions into Nonlocal Theories”
12:00 – 12:30  T. Mengesha, University of Tennessee, Knoxville
  “A Nonlocal Characterization of Sobolev, BV and BD Spaces: A Unified Approach”
12:30 – 14:00  Lunch
14:00 – 14:30  Q. Du, Columbia University
  “Robust Nonlocal Stress Analysis via Asymptotically Compatible Discretization”
14:30 – 15:00  H. Wang, University of South Carolina
  “Fast Numerical Methods for Peridynamic Models”
15:00 – 15:30  P. Seleson, Oak Ridge National Laboratory
  “Multiscale Coupling Methods in Peridynamics”
15:30 – 16:00  Coffee break
16:00 – 16:30  A. Salgado, University of Tennessee, Knoxville
  “A PDE Approach to the Fractional Obstacle Problem”
16:30 – 17:00  G. Zhang, Oak Ridge National Laboratory
  “Numerical Methods for a Class of Nonlocal Diffusion Problems with the Use of Backward SDEs”
17:00 – 18:15  Poster Session B - Reception
  B.1 B. Alali, Kansas State University
  “Peridynamics and Material Surfaces”
  B.2 F. Han, KAUST, Saudi Arabia
  “A Morphing Approach to Couple State-Based Peridynamics with Classical Continuum Mechanics”
  B.3 J. Jamieson, University of Nebraska-Lincoln
  “Non-Local A-Harmonic Approximation”
  B.4 E. Otárola, Universidad Técnica Federico Santa María, Chile
  “A PDE Approach to Space-Time Fractional Parabolic Problems”
  B.5 M. Parks, Sandia National Laboratories
  “A Multi-Time-Step Method for Partitioned Time Integration of Peridynamics”
  B.6 Y. Tao, Columbia University
  “Analysis and Approximation of a Nonlocal Diffusion Model with Neumann Type Constraints”
  B.7 X. Tian, Columbia University
  “Asymptotically Compatible Schemes for Robust Discretization for Nonlocal Models”
  B.8 J. Trageser, George Washington University
  “A Fourth Order Nonlocal Operator and Its Connection to the Biharmonic”
B.9  R. Wildman, Army Research Laboratory
"Hybrid Finite Difference/Peridynamics in 3D"

B.10  X. Xie, Illinois Institute of Technology
"Two Types of Nonlocal Diffusions and the Convergence to the Random/Normal Diffusion"

B.11  F. Xu, Florida State University
"Local Mesh Refinement in a Multiscale Finite Element Implementation of Nonlocal Models of Mechanics"

B.12  J. York, University of Texas at Austin
"A Peridynamic Model for Hydraulic Fracture"

18:30  Bus departs from ORNL to Riverside Grille in Oak Ridge

19:00 – 20:30 Banquet

20:45  Bus departs from Riverside Grille to DoubleTree Hotel

Wednesday, October 28, 2015

8:00  Bus departs from DoubleTree Hotel to ORNL

8:30 – 9:00  Registration

9:00 – 10:00  D. Littlewood, Sandia National Laboratories. Survey Talk
"Progress and Challenges in Computational Peridynamics"

10:00 – 10:30  Coffee break

10:30 – 11:00  J.S. Chen, University of California, San Diego
"Fracture to Damage Multiscale Mechanics and Modeling"

11:00 – 11:30  M. Schweitzer, University of Bonn, Germany
"A Partition of Unity Method Enriched with Peridynamics"

11:30 – 12:00  J. Foster, University of Texas at Austin
"Isogeometric Peridynamics"

12:00 – 12:30  G. Wagner, Northwestern University
"Meshfree Methods for Physically-Based Fractional Order Partial Differential Equations"

12:30 – 13:00  Discussion of future directions

13:00 – 14:00  Lunch

14:00 – 15:00  ORNL lab tour (optional): Spallation Neutron Source

15:00 – 16:30  ORNL lab tour (optional): Graphite Reactor and Supercomputing Center

16:30  Bus returns to DoubleTree Hotel