

Date: **Tuesday, June 4, 2013, 10:00 - 11:00am**

Location: **Hackerman 209**

Speaker: **Professor Dong Qian**
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A Bridging Scale Space-Time Approach to Coupled Atomistic/Continuum Simulation

Many engineering applications are featured by a multitude of spatial and temporal scales that poses a great challenge for design and analysis. In this talk, I will address this important subject with the development of bridging scale methods based on the integration of an enriched space-time finite element method with molecular dynamics. The established space-time framework allows for a flexible choice of the time step sizes in different regions of interest thereby circumventing the limitation associated with the critical time step size in the traditional explicit time integration scheme. Physics-based enrichment further enhances the convergence and accuracy. Concurrent coupling between the fine and coarse scale simulations is achieved with the introduction of projection operators and bridging scale treatment, which leads to a seamless interface between the continuum and atomistic representations. An important feature of the method is that the time evolution of the fine scale phenomena can be adaptively tracked with the multi-temporal scale characteristic of the approximation. After an outline of the formulation, the robustness of the method will be demonstrated in the cases of simulating lattice dynamics in one spatial dimension and dynamic fracture in two dimensional lattices.

About the Speaker

Dr. Dong Qian is an associate professor of mechanical engineering at the University of Texas at Dallas. He received his B.S. degree in Bridge Engineering from Tongji University in China in 1994, his M.S. degree in Civil Engineering from the University of Missouri in 1998 and Ph.D. degree in Mechanical Engineering from Northwestern University in 2002. Shortly after his graduation, He was hired as an assistant professor of mechanical engineering in the University of Cincinnati and promoted to the rank of associate professor with tenure in 2008. In the Fall of 2012, he joined the newly established Mechanical Engineering Department as a tenured associate professor at the University of Texas at Dallas. Dr. Qian has conducted research in the general areas of computational mechanics of materials and is an author/co-author of over 50 published/accepted journal papers/book chapters and one book with ~2000 citations according to google scholar. His research has been funded by NSF, AFOSR, AFRL, State of Ohio and industries such as P&G and General Electric. He is currently the assistant editor for the Journal of Computational Mechanics. Dr. Qian received a Young Investigator Award at the 3rd International Symposium on Computational Mechanics in 2011, the Distinguished Researcher award in 2010 and the Junior Faculty Research Award in 2008 by the college of Engineering at UC. He is an active member of ASME and USACM.

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