1077-37-1005 **Tuhin Sahai*** (sahait@utrc.utc.com), 411 Silver Lane, MS 129-85, East Hartford, CT 06118.
Designing Scalable Algorithms for Complex Networks.

Complex networks such as building systems, UAV swarms and communication networks are of paramount importance to modern day applications and particularly challenging from an analysis perspective.

For scalable analysis of large networks, our approach first uses a novel decentralized clustering approach, based on propagating waves in the graph, for partitioning the system of differential equations. The partitioned system is then simulated using adaptive waveform relaxation, an efficient approach for the distributed simulation of differential algebraic equations. We demonstrate the efficacy of this two step approach for simulating large models of building systems and electrical circuits.

Polynomial Chaos based methods are used extensively for propagating uncertainty through smooth dynamical systems. Though useful for systems of small to moderate dimension, the curse of dimensionality restricts the applicability of these methods to high dimensional dynamical systems. We show how our simulation framework can also be used to propagate uncertainty through large dynamical systems. (Received September 15, 2011)