

Bio:

Zoltan Toroczkai received a Ph.D. degree in theoretical physics from Virginia Tech in 1997. Until 2000 he worked as a postdoctoral associate in the theoretical condensed matter group at University of Maryland at College Park. In 2000 he then joined Los Alamos National Laboratory as a Director's Postdoctoral Fellow and he became a technical research staff member in 2002. Since 2004 he is the deputy director of the Center for Nonlinear Studies at Los Alamos National Laboratory. His main research interests include complex networks, fundamentals of agent-based systems and social dynamics modeling, non-equilibrium statistical mechanics, nonlinear dynamical systems and chaos theory with various applications, including control theory and fluid dynamics.

Topic of the tutorial:

In this lecture I will present a couple of examples of network optimization and flow performance improvement by exploiting some of the intricate relationships between flow performance and maximum flow subgraphs, also called gradient networks. Examples include solving the scalability problem of discrete event parallel computation via a proper design of the communication network topology of the processing elements; the improvement on the queuing properties of packet switched communication networks by introducing certain routing protocols and finally, if time permits I will present an application of the notion of gradient networks to protein folding.