1086-41-2332 **Marc Kjerland*** (kjerland@math.uic.edu) and **Rafail Abramov**. *Linear response closure approximation for slow dynamics of a multiscale system with linear coupling.*

Many applications of contemporary science involve multiscale dynamics, typically characterized by time and space scale separation of patterns of motion with a large set of rapidly evolving variables and a smaller set of slowly evolving variables. This causes direct numerical simulation to be computationally expensive, due to the large number of variables and to the small timestep discretization needed for the fast-scale dynamics. We present a method to obtain a closed system for the evolution of the slow variables requiring only a simple computation of statistics of the fast variables and use of the fluctuation-dissipation theorem, a tool from statistical dynamics, to get a correction term for the averaged fast dynamics. We apply this method to a two-scale model with linear coupling and accurately capture the statistics of the full system and response to forcing perturbations. (Received September 25, 2012)