1035-82-1299   **Rafail V. Abramov*** (`abramov@math.uic.edu`) and **Andrew J. Majda**. *New Algorithms and Applications of the Fluctuation-Dissipation Theorem for Climate Response.*

The response of climate dynamics on the planetary scale to changes of various global physical parameters is an area which is being extensively studied in the contemporary atmosphere-ocean science. Recently, we developed and tested novel computational algorithms for predicting the mean linear response of a chaotic dynamical system to small changes in external forcing via the fluctuation-dissipation theorem (FDT). Unlike the earlier work in developing FDT-based computational strategies for chaotic nonlinear systems with forcing and dissipation, these new methods are based on the theory of SRB probability measures, which commonly describe the equilibrium state of such dynamical systems. The new linear response algorithms are tested on a nonlinear model with chaotic behavior, forcing, dissipation, which mimics large-scale features of real-world geophysical models in a wide range of dynamical regimes varying from weakly to strongly chaotic, and to fully turbulent. The new methods yield greater accuracy than classical FDT methods for the linear response of both mean state and variance across all the different chaotic regimes of the dynamical system. These results point the way toward the potential use of the new response algorithms in operational long-term climate change prediction. (Received September 19, 2007)