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**Lili Ju\***, Department of Mathematics, University of South Carolina, Columbia, SC 29208. *Fast Explicit Integration Factor Methods for Semilinear Parabolic Equations.*

In this talk, we present an explicit numerical method and its fast implementation for the solution of a wide class of semilinear parabolic equations including the Allen-Cahn equation as a special case. The method combines decompositions of compact spatial difference operators on a regular mesh with stable and accurate exponential time integrators and efficient discrete FFT-based algorithms. It can deal with stiff nonlinearity and both homogeneous and inhomogeneous boundary conditions of different types based on multistep approximations and analytic evaluations of time integrals. Numerical experiments demonstrate effectiveness of the new method for both linear and nonlinear model problems. (Received July 28, 2014)