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Robert J. Buckingham* (robbyjb@umich.edu), Department of Mathematics, 2074 East Hall, 530 Church St., Ann Arbor, MI 48109, and **Peter D. Miller**. *Asymptotics of the Semiclassical Sine-Gordon Equation*.

The modeling of magnetic flux propagation in Josephson junctions motivates the study of the sine-Gordon equation with a fixed initial condition and dispersion tending to zero. We present two families of initial data, with topological charge zero and one, respectively, for which the sine-Gordon equation can be solved explicitly for arbitrarily small values of the dispersion parameter. Plots of the solutions for small dispersion reveal, depending on the choice of other parameters, regions of pure librational and rotational motion as well as regions of multi-phase waves separated by primary and secondary nonlinear caustics. We cover current progress on the asymptotic analysis of these solutions for small dispersion. (Received September 20, 2007)