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**Christine Sample\*** ([c-sample@northwestern.edu](mailto:c-sample@northwestern.edu)), Engineering Sciences and Applied Mathematics, Northwestern University, 2145 Sheridan Road, Evanston, IL 60208-3125, and **Alexander Golovin**. *Nonlinear dynamics of a double bilipid membrane.*

The nonlinear dynamics of a double biological membrane that consists of two coupled lipid bilayers, typical of some intra-cellular organelles such as mitochondria, is studied. A phenomenological free-energy functional is formulated in which the curvatures of the two parts of the double membrane are coupled to the lipid densities. The derived system of coupled nonlinear evolution equations for the double membrane dynamics is studied analytically and numerically. The linear stability analysis is performed and the domain of parameters in which the double membrane is stable is found. For the parameter values corresponding to an unstable membrane we perform 2-D numerical simulations that reveal various types of complex dynamics. (Received August 24, 2007)