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**Yosi Shibberu\*** ([shibberu@rose-hulman.edu](mailto:shibberu@rose-hulman.edu)), Rose-Hulman Institute of Technology, 5500 Wabash Ave., Terre Haute, IN 47803. *Is symplectic-energy-momentum integration well-posed?*

Despite its aesthetic appeal, the extended phase space formulation of the principle of least action is not widely used because it leads to indeterminate equations of motion. Symplectic-energy-momentum (SEM) integration is based on a discrete version of this variational principle. We prove that, under certain conditions, SEM integration is actually well-posed. We also show that there exist points in extended phase space for which the discrete-time Hamilton (DTH) equations of SEM integration have no solution for arbitrarily small time steps. The nonlinear pendulum is used as an example to illustrate the main ideas involved. (Received September 25, 2006)