1036-78-120 **Brandon G. Bale*** (bgbale@hotmail.com), University of Washington, Applied Mathematics, Box 352420, Seattle, WA 98195-2420. *Mode-locking Dynamics: Attracting States, Limit Cycles, and Bifurcations.*

A theoretical model is developed for characterizing mode-locking behavior using a variational method. Fundamental in driving the laser dynamics is the experimentally verified nontrivial phase profiles. These dynamics are combined with discrete components of the mode-locked laser which are responsible for large intra-cavity pulse fluctuations. The reduced models characterize the stable mode-locking by exhibiting underlying stable nodes, spirals, and limits cycles, providing an excellent theoretical framework for understanding and optimizing laser performance. (Received January 18, 2008)