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J. Nathan Kutz* (kutz@amath.washington.edu), Applied Mathematics, University of Washington, Box 352420, Seattle, WA 98195-2420. *Proper Orthogonal Decomposition for Characterizing Nonlinear Wave Dynamics in Mode-Locked Lasers.*

Dimensionality reduction provides an important theoretical framework for characterizing the underlying dynamics and bifurcations in many nonlinear wave systems. The method of proper orthogonal decomposition (POD), or principal component analysis, is used here to demonstrate that low-dimensional systems generated by a POD analysis provides an excellent framework for characterizing the bifurcation behavior in mode-locked laser systems. More generally, the POD is shown to be an excellent dimensionality reduction technique for both Hamiltonian and dissipative nonlinear wave equations. (Received July 17, 2010)