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Energy Exchange In Coupled Systems[1] IBERE CALDAS, MEIRIELEN SOUSA, FRANCISCO MARCUS, University of Sao Paulo, ADRIANE SCHELIN, University of Brasilia, RICARDO VIANA, Federal University of Parana — We present an approach to identify energy exchange in nonlinear coupled systems and to investigate how this exchange depends on the system control parameters. To illustrate this approach, we evaluate the energy coupling of the bi-dimensional spring pendulum, a paradigm to study nonlinear coupled systems and a model for several systems. The dynamics of a spring pendulum varies according to its total energy and one control parameter that accounts for its physical characteristics. This variation is presented in a sequence of Poincaré sections of the system which show a characteristic order-chaos-order transition as we change its energy and control parameter. We identify the spring and pendulum like motions and an analytical expression for the coupling energy between them. With this expression we obtain the energy exchange during individual trajectories and identify regions in the parameter space that correspond to strong and weak coupling.

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