

Liapunov-Schmidt Reduction and Continuation for the Coupled Nonlinear Schrödinger Equations

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Abstract — We study the bifurcation scenario of M coupled nonlinear Schrödinger equations, $M \geq 3$. First we apply the Liapunov-Schmidt reduction to show that the bifurcations are pitchfork. The pitchfork bifurcation can be subcritical or supercritical depending on the coupling coefficients we choose. Next we apply the numerical continuation method to trace the first solution branch and solution surfaces by varying the coupling parameters, where the system is discretized by the centered difference approximations. Numerical results on the three coupled nonlinear Schrödinger equations are reported.

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