Power switching in hybrid coherent couplers

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We report on a theoretical and numerical investigation of the switching of power in new hybrid models of nonlinear coherent couplers consisting of optical slab waveguides with various orders of nonlinearity. The first model consists of two guides with second-order instead of the usual third-order susceptibilities as typified by the Jensen coupler. This second-order system is shown to have a power self-trapping transition at a critical power greater than the third-order susceptibility coupler. Next, we consider a mixed coupler composed of a second-order guide coupled to a third-order guide and show that, although it does not display a rigorous self-trapping transition, for a particular choice of parameters it does show a fairly abrupt trapping of power at a lower power than in the third-order coupler. By coupling this mixed nonlinear pair to a third, purely linear guide, the power trapping can be brought to even lower levels and in this way a satisfactory switching profile can be achiev