D.5 Unbounded solitonic channels in media with competing third- and fifth-order nonlinearities

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This paper summarizes the theoretical studies on the dynamic propagation, in particular the scenario for stability, of spatial solitonic channels, both types of "grey" and bright with non-zero background intensity (unbounded), in optical media in which the third- (Kerr) and fifth-order nonlinear effects are significant and compatible. The stability of the channels depends on both the initial launched solitonic channels and the relative strength between these nonlinear effects. It has been demonstrated, as usually observed for solitary waves, that the initial amplitude and phase of the launched solitons dictate the splitting, diffraction and oscillation of the propagated "grey" or unbounded bright nonlinear beams. The nonlinear Schrödinger wave equation and the specific initial conditions for the spatial propagation of the two cases are outlined and graphical illustrations of the evolutions of the unbounded solitonic channels are presented.