Reflection and Transmission of Nonlinear Matter Waves in Two Immiscible Bose-Einstein Condensates

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We theoretically investigate the one-dimensional dynamics of a dark soliton in a two-component immiscible mixture of Bose-Einstein condensates with repulsive interactions. We analyze the reflection and transmission of a soliton when it propagates through the domain wall. We show that a dark-bright soliton can be dynamically generated by the interaction of the moving dark soliton with the domain wall, outside the regime of parameters where stationary solutions are known to exist. The dynamics of this dark-bright soliton is harmonic like, with a a numerical frequency that is in good agreement with the predictions of a semi-analytical model.