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Vidals simulation method applied to two coupled 1D lattices
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— Recently, a method was developed employing matrix product states to simulate the quantum dynamics of a one dimensional lattice system using an adaptive time stepping technique [G. Vidal, Phys. Rev. Lett. 91, 147902 (1993); Phys. Rev. Lett. 93, 040502 (1994)]. We use this approach to simulate the dynamics of bosons loaded into a double-well optical lattice geometry relevant to recent experiments at NIST [I. Spielman et al., Bull. Am. Phys. Soc. (2005)]. We study a pair of coupled 1D lattices, which can be mapped into a single 1D lattice with next-nearest neighbor interactions.

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