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Variational wave function approach to quantum quenches in bosonic systems FEDERICO BECCA, GIUSEPPE CARLEO, STEFANO BARONI, CNR, Istituto Officina dei Materiali and SISSA, Trieste — Recent experiments with ultracold atomic gases have opened the possibility for studying non-equilibrium quantum dynamics of many-body systems. In particular, the high degree of tunability allows one to rapidly change system parameters and observe the subsequent quantum evolution. We present a new variational approach to deal with time-dependent problems where quantum quenches of the microscopic parameters induce a highly non-trivial dynamics. We show to what extent a generalization of the Jastrow wave function may accomplish this task, even for two-dimensional models, where standard Lanczos or density-matrix renormalization group methods are highly limited. Examples for interacting hard-core and soft-core bosons are shown. The generalization to fermionic models is also discussed.

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