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# Entanglement dynamics following a sudden quench - an exact approach

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**Abstract:**

We present an exact and fully analytical treatment of the entanglement dynamics for an isolated system of $N$ coupled oscillators following a sudden quench of the system parameters. The system is analyzed using the solutions of the time dependent Schrodinger's equation, which are obtained by solving the corresponding nonlinear Ermakov equations. The entanglement entropies exhibit a multi-oscillatory behaviour, where the number of dynamically generated time scales increases with $N$. The harmonic chains exhibit entanglement revival and for larger values of $N(> 10)$, we find near-critical logarithmic scaling for the entanglement entropy, which is modulated by a time dependent factor. The $N = 2$ case is equivalent to the two site Bose-Hubbard model in the tunneling regime, which is amenable to empirical realization in cold atom systems.

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