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Losses due to phonon-phonon interactions in nanotube oscillators: from classical potentials through one-dimensional elasticity and many-body perturbation theory

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Phonon-phonon losses are an intrinsic loss mechanism and it is therefore important to calculate their magnitude as an upper bound on the quality factor of any nano-oscillator. We will present an approach to handling the problem of phonon-phonon interactions in nanotube oscillators which uses an empirical interatomic potential to compute the input parameters for a fully quantum-mechanical green function-based method. This approach allows us to compute losses at temperatures comparable to or below the Debye temperature (> 500K), allowing comparison with experimental results.