

# Continuum limit for a model of ionic lattices

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We study the continuum limit of a one dimensional model of an ionic lattice, with short-range and long-range interactions. The short range interactions arise from a convex potential energy between ions, while the long range interactions are of generalized electrostatic type. At the discrete (lattice) level the equations can be formulated as a system of second order ODEs with conserved energy associated to a Lagrangian. Interpolating these in the continuum limit of many ions with small spacing leads to an approximation of a limit system of nonlinear elastodynamics with non-local long range forces. The limit gives a dissipative measure-valued solution, which coincides with a classical weak solution when this exists, thus establishing strong convergence in the continuum limit in this case. We will also discuss limiting nonlocal energies which appear in higher dimensional generalizations of the model.