On the variational limit of some nonlocal functionals

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ABSTRACT

In this paper we study a class of variational problems associated with nonlocal elastic energy of peridynamic-type which result in nonlinear nonlocal systems of equations with various volumetric constraints. The well-posedness of variational problems is established via careful studies of the related energy spaces which are made up of vector-valued functions. In the event of vanishing nonlocality we establish the convergence of the nonlocal energy to a corresponding local energy via Gamma convergence. For some convex energy functionals we will explicitly find the corresponding limit energy. As a special case the classical Navier-Lame potential energy will be realized as a limit of linearized peridynamic energy offering a rigorous connection between the nonlocal peridynamic model to classical mechanics for small uniform strain.

REFERENCES

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