

# Jacobians and Convergence of Energies

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**Abstract:** Many models from material science follow from a free energy and contain a distinguishing length scale. Such models include superconductivity, superfluids, micromagnetics, among others. Under certain limits of the length scale, the energy becomes a harmonic map with singularities. I will discuss how understanding the limiting behavior of these energies is related to understanding the Jacobian of the underlying function. I will then discuss some applications of these results to problems arising from material science.