

A FRACTIONAL KORN-TYPE INEQUALITY WITH APPLICATIONS TO PERIDYNAMICS

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We show that a class of spaces of vector fields whose semi-norms involve the magnitude of “directional” difference quotients is in fact equivalent to the class of fractional Sobolev spaces. The equivalence can be considered a Korn-type characterization of fractional Sobolev spaces. We use the result to better understand the energy space associated to a strongly coupled system of nonlocal equations related to a nonlocal continuum model via peridynamics. Moreover, the equivalence permits us to apply classical Sobolev embeddings in the process of proving that weak solutions to the nonlocal system enjoy both improved differentiability and improved integrability.