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On the equivalence of fractional-order Sobolev semi-norms ^{*}

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Abstract

Finite and boundary element approximation error analysis consists mainly in two parts: the Bramble-Hilbert lemma and scaling properties under affine transformations of semi-norms. In the case of problems with singularities often solutions are measured by fractional-order Sobolev regularity, and there is no unique way to define semi-norms. Scaling properties are essential also in other areas of numerics, e.g., the analysis of preconditioners. Depending on the analytical setup, different definitions are useful in different situations and the important question of equivalence of semi-norms appears. In this talk we present three definitions of Sobolev semi-norms of orders between zero and one, and study their equivalence.

Key words: finite and boundary element error analysis, Sobolev spaces, semi-norms, affine transformations

Mathematics subject classifications (1991): 46E35, 47A30, 65N38

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