On certain properties of spaces of locally Sobolev functions

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Abstract. In recent years the locally Sobolev functions got quite popular in works on applications of partial differential equations. However, the properties of those spaces have not been systematically studied and proved in the literature, resulting in many particular proofs by reduction to classical Sobolev spaces.

Following some hints of general theory scattered through classical literature (where famous authors probably new the properties, but never found the time to write them down), as well as some proofs of special cases (namely, the Hilbert case), we systematically present the main results regarding the properties of $W^{m,p}_{loc}$ spaces, their duality, imbedings, density, weak topologies, etc., with particular emphasis to application in studying partial differential equations of mathematical physics.

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