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Stengthened Fractional Sobolev Inequalities and Geometric Inequalities

This study has two primary objectives. The first is to enhance fractional Sobolev-type inequalities in Besov spaces using the framework of classical Lorentz spaces. In this process, we establish that the Sobolev inequality in Besov spaces is equivalent to the fractional Hardy inequality and an iso-capacitary-type inequality.

The second objective is to strengthen fractional Sobolev-type inequalities in Besov spaces through capacitary Lorentz spaces associated with Besov capacities. To achieve this, we first analyze the embedding of the associated capacitary Lorentz space into the classical Lorentz space. Subsequently, we establish the embedding of the Besov space into the capacitary Lorentz space. Additionally, we demonstrate that these embeddings are intricately connected to iso-capacitary-type inequalities, interpreted through a newly introduced fractional $(\beta, p, q)-$perimeter. Furthermore, we provide characterizations of more general Sobolev-type inequalities in Besov spaces.