Gagliardo-Nirenberg inequality in Banach function spaces

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Gagliardo-Nirenberg interpolation inequality estimates the norm of the intermediate derivative by the norms of the function itself and the norm of the higher derivative. In the original papers, the Lebesgue norms are used, and later much more general families of norms and even other terms are introduced. We introduce the general formula for how to establish if the inequality is valid for a triplet of general r.i. Banach function spaces.

The essential tools are the pointwise estimate developed by A. Kłamajska and later independently by V. Maz'ja and T. Shaposhnikova and variants of the Hölder inequality for functions of r. i. BFS. We obtain the optimal version of the G-N estimate in general r. i. Banach function spaces. Joint work with A. Fiorenza, M. R. Formica, K. Lesnik, A. Molchanova, and F. Soudský.