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Critical imbeddings with multivariate rearrangements. (English) Zbl 1131.46026
Stud. Math. 181, No. 3, 255-284 (2007).

Critical embeddings of Besov and Triebel–Lizorkin spaces with dominating mixed derivatives into multivariate exponential Orlicz and Lorentz–Orlicz spaces are investigated. The target spaces are defined in terms of multivariate non-increasing rearrangements and related multivariate averages. Multivariate Lorentz spaces and multivariate (exponential) Lorentz–Orlicz spaces are defined and compared with the usual Lorentz and usual exponential Orlicz spaces. The multivariate version of the above spaces are better adapted to be target spaces of critical embeddings of the spaces of dominating mixed derivatives. The limiting embeddings of the Besov spaces $S_{p,q}^{N/p}B(\mathbb{R}^N \times \mathbb{R}^N)$ and the Triebel–Lizorkin spaces $S_{p,q}^{N/p}F(\mathbb{R}^N \times \mathbb{R}^N)$ into multivariate Lorentz–Orlicz spaces are proved. The method of the proof is based on an atomic characterization of the spaces. The sharpness of the embeddings is discussed in terms of the multivariate version of growth envelope functions.

Reviewer: [Leszek Skrzypczak \(Poznań\)](#)

MSC:

- 46E35** Sobolev spaces and other spaces of “smooth” functions, embedding theorems, trace theorems
- 46E30** Spaces of measurable functions (L^p -spaces, Orlicz spaces, Köthe function spaces, Lorentz spaces, rearrangement invariant spaces, ideal spaces, etc.)
- 42B35** Function spaces arising in harmonic analysis

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Keywords:

limiting embeddings; dominating mixed derivatives; Besov spaces; Triebel–Lizorkin spaces; Lorentz–Orlicz spaces

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