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Decomposition of Besov spaces. (English) Zbl 0551.46018
Indiana Univ. Math. J. 34, 777-799 (1985).

Using a general decomposition result for distributions and a classical theorem of Plancherel-Pólya, we obtain two decompositions of elements of the Besov spaces $\dot{B}_p^{\alpha q}(\mathbb{R}^n)$ and $B_p^{\alpha q}(\mathbb{R}^n)$, $-\infty < \alpha < +\infty$, $0 < p, q \leq +\infty$, into sums of basic functions. In the first decomposition, the basic functions are similar to the atoms in the atomic decomposition of the Hardy spaces. In the second, they are taken from a fixed family of rapidly decreasing functions whose Fourier transforms have compact support. We also give a decomposition of the second type for BMO. Simple consequences are that the trace of $\dot{B}_p^{q/p}$ or $B_p^{q/p}$ is L^p if $q \leq \min(1, p)$, $0 < p < +\infty$, and that the Besov spaces have the lower majorant property if $0 < p \leq 1$.

MSC:

- [46E35](#) Sobolev spaces and other spaces of “smooth” functions, embedding theorems, trace theorems
- [42B10](#) Fourier and Fourier-Stieltjes transforms and other transforms of Fourier type
- [42B30](#) H^p -spaces

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Keywords:

decompositions; Besov spaces; atomic decomposition of the Hardy spaces; Fourier transforms; BMO; trace; lower majorant property

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