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Title: Characterizations of the multiple Littlewood–Paley operators on product domains

Author(s): Feng Liu and Qingying Xue

Let $m, n \geq 1$. Define the multiple Littlewood–Paley operator $\mathcal{G}_\Psi$ by

$$\mathcal{G}_\Psi(f)(x, y) := \left(\int_0^\infty \int_0^\infty |\Psi_{t,s} * f(x, y)|^2 \frac{dt ds}{ts} \right)^{1/2},$$

where $\Psi(x, y) \in L^1(\mathbb{R}^m \times \mathbb{R}^n)$ and $\Psi_{t,s}(x, y) = t^{-m}s^{-n}\Psi(t^{-1}x, s^{-1}y)$. In this paper, we present several characterizations of the L^2 -boundedness for Littlewood–Paley functions on product domains.

Address:

Feng Liu
College of Mathematics
and Systems Science
Shandong University
of Science and Technology
266590 Qingdao, Shandong
P. R. China

Address:

Qingying Xue
School of Mathematical Sciences
Beijing Normal University
Laboratory of Mathematics
and Complex Systems
Ministry of Education
Beijing 100875
P. R. China