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

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

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

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.

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