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Refined Hardy inequalities

HAJER BAHOURI, JEAN-YVES CHEMIN AND ISABELLE GALLAGHER

Abstract. The aim of this article is to present "refined" Hardy-type inequalities. Those inequalities are generalisations of the usual Hardy inequalities, their additional feature being that they are invariant under oscillations: when applied to highly oscillatory functions, both sides of the refined inequality are of the same order of magnitude. The proof relies on paradifferential calculus and Besov spaces. It is also adapted to the case of the Heisenberg group.

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