Annals of Functional Analysis

Ann. Funct. Anal. 1 (2010), no. 2, 112–120
ANNALS OF FUNCTIONAL ANALYSIS
ISSN: 2008-8752 (electronic)
URL: www.emis.de/journals/AFA/

ON POINTWISE INVERSION OF THE FOURIER TRANSFORM OF BV_0 FUNCTIONS

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Communicated by J. Esterle

ABSTRACT. Using a Riemann-Lebesgue lemma for the Fourier transform over the class of bounded variation functions that vanish at infinity, we prove the Dirichlet–Jordan theorem for functions on this class. Our proof is in the Henstock–Kurzweil integral context and is different to that of Riesz-Livingston [Amer. Math. Monthly 62 (1955), 434–437]. As consequence, we obtain the Dirichlet–Jordan theorem for functions in the intersection of the spaces of bounded variation functions and of Henstock–Kurzweil integrable functions. In this intersection there exist functions in $L^2(\mathbb{R})\backslash L(\mathbb{R})$.

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Date: Received: 22 November 2010; Accepted: 29 December 2010.
2010 *Mathematics Subject Classification.* Primary 42A38; Secondary 26A39.
Key words and phrases. Fourier transform, Henstock–Kurzweil integral, Dirichlet-Jordan theorem.