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SMOOTHNESS IMPROVEMENT FOR TEMPERATURES IN TERMS OF THE BESOV REGULARITY OF INITIAL AND DIRICHLET DATA

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ABSTRACT. Jerison and Kenig in J. Funct. Anal. 130 (1995), no. 1, 161–219, gave a precise region $\mathcal{R}$ in the square $[0,1]^2$ for the pairs $(s, \frac{1}{p})$ for which every harmonic function in the Lipschitz domain D, with Dirichlet data in $B^s_p(\partial D)$, belongs to $B_p^{s+\frac{1}{p}}(D)$. We prove that every temperature u in $\Omega = D \times (0,T)$ belongs to $\mathbb{B}^\alpha_\tau(\Omega)$ with $\frac{1}{\tau} = \frac{1}{p} + \frac{\alpha}{d}$, $0 < \alpha < \min\{d\frac{p-1}{p}, (s+\frac{1}{p})\frac{d}{d-1}\}$ provided that the Dirichlet data f belongs to $B^s_p(\partial D)$ and that the initial condition g belongs to $B_p^{s+\frac{1}{p}}(D)$, whenever $(s, \frac{1}{p}) \in \mathcal{R}$. The result follows from those by T. Jakab and M. Mitrea in Math. Res. Lett. 13 (2006), no. 5-6, 825–831 and from *Parabolic Besov regularity for the heat equation* by the authors available in *http://www.cimec.org.ar/ojs/index.php/cmm/article/view/3729*