ON THE WEIGHTED HARDY TYPE INEQUALITY IN A FIXED DOMAIN
FOR FUNCTIONS VANISHING ON THE PART OF THE BOUNDARY

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Abstract. We derive and discuss a new two-dimensional weighted Hardy-type inequality in a rectangle for the class of functions from the Sobolev space H^1 vanishing on small alternating pieces of the boundary.

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REFERENCES

[1] G. A. CHECHKIN, YU. O. KOROLEVA AND L. -E. PERSSON, *On the precise asymptotics of the constant in the Friedrich's inequality for functions, vanishing on the part of the boundary with microinhomogeneous structure*, J. Inequal. Appl., **2007** (2007), Article ID 34138, 13 pages.

[2] G. A. CHECHKIN, YU. O. KOROLEVA, A. MEIDELL AND L. -E. PERSSON, *On the Friedrichs inequality in a domain perforated nonperiodically along the boundary. Homogenization procedure. Asymptotics in parabolic problems*, Russ. J. Math. Phys., **16**, 1 (2009), 1–16.

[3] D. GILBARG AND N. TRUDINGER, *Elliptic Partial Differenrial Equations of Second Order,* Springer-Verlag, 1983.

[4] P. HAJLASZ, *Pointwise Hardy inequalities*, Proc. Amer. Math. Soc., **127** (1999), 417–423.

[5] G.H. HARDY, J.E. LITTLEWOOD AND G. PÓLYA, *Inequalities*, Cambridge Mathematical Library (Reprint of the 1952 edition ed.), Cambridge: Cambridge University Press, 1988.
Math. Anal., **109** (1934), 463–487, 685–713.

[6] I. S. KAC AND M. G. KREIN, *Criteria for discreteness of the spectrum of a singular string*, Izv. Vyss. Uchebn. Zaved. Mat., **2** (1958), 136–153.[in Russian]

[7] J. KINNUNEN AND R. KORTE, *Characterizations for Hardy's Inequality*, Around the Research of Vladimir Maz'ya, International Mathematical Series, **11** (2010), 239–254.

[8] V. KOKILASHVILI, A. MESKHI AND L.-E. PERSSON, *Weighted Norm Inequalities For Integral Transforms With Product Kernals*, Nova Science Publishers Inc (United States), 2009.

[9] A. KUFNER, *Weighted Sobolev Spaces*, John Wiley and Sons, 1985.

[10] A. KUFNER, L. MALIGRANDA AND L.-E. PERSSON, *The Hardy Inequality. About its History and some Related Results*, Vydavetelsky Servis Publishing House, Pilsen, 2007.

[11] A. KUFNER AND L.-E. PERSSON, *Weighted Inequalities of Hardy Type*, World Scientific, New Jersey-London-Singapore-Hong Kong, 2003.

[12] V. G. MAZ'JA, *Sobolev spaces*, Translated from the Russian by T.O. Shaposhnikova, Springer Series in Soviet Mathematics, Springer-Verlag, Berlin, 1985.

[13] J. NEČAS, *Sur une méthode pour résourde les équations aux dérivées partielle du type elliptique, voisine de la variationelle*, Ann. Scuola Norm. Sup. Pisa, **16** (1962), 305–362.

[14] B. OPIC AND A. KUFNER, *Hardy-Type Inequalities*, Longman, Harlow, 1990.

[15] W. ZIEMER, *Weakly Differentiable Functions,* Graduate Texts in Mathematics 120, Springer-Verlag, 1989.

[16] A. WANNEBO, *Hardy Inequalities and Imbedding in Domains Generalizing $C^{0,\lambda}$ Domains*, Proc. Amer. Math. Soc., **122** (1994), 1181–1190.
Reprint of the sixth (1980) edition. Classics in Mathematics, Springer-Verlag, Berlin, 1995.

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