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**Svitlana Mayboroda\***, svitlana@math.purdue.edu, and **Alexander Volberg**. *Square function, Riesz transform and rectifiability*.

A celebrated 1991 theorem of David and Semmes ascertains that the  $L^2$ -boundedness of all Calderón-Zygmund operators with respect to a Hausdorff measure  $H^s$  on a set  $E$  implies that  $s$  is an integer and  $E$  is rectifiable (“contains big pieces of Lipschitz graphs”). In the present work we establish that it is, in fact, sufficient to assume pointwise boundedness of a single operator, namely, the square function associated to the Riesz transform, in order to arrive to the same conclusion. (Received September 09, 2009)