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**Vincent Millot\*** (vmillot@andrew.cmu.edu), Department of Mathematical Sciences, Carnegie Mellon University, Pittsburgh, PA 15213, and **Adriano Pisante**. *The dipole problem for  $S^1$ -valued maps with  $H^{1/2}$ -regularity*. Preliminary report.

We consider for maps in  $\dot{H}^{1/2}(\mathbb{R}^2; S^1)$ , an energy related to a seminorm equivalent to the standard one. This seminorm is associated to an optimal extension to the half space. For maps having two prescribed singularities of opposite charge, we show that the infimum of the energy is equal to the distance between the two singular points. Concerning the asymptotic behavior of minimizing sequences, we prove that the energy concentrates near a 1-rectifiable current on the plane and the concentration phenomenon is described in terms of bubbling-off of circles. (Received August 10, 2006)