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Dynamic critical behavior of YBCO thin films/crystals[1] HUA XU, SU LI, CHRISTOPHER LOBB, STEVEN ANLAGE, Center for Nanophysics and Advanced Materials, University of Maryland, College Park — The zero-field phase transition of high T_c superconductors has been studied by a number of techniques. However transport properties (such as the conductivity) which probe the dynamics near T_c are less explored, and a wide range of critical exponents have been reported experimentally. We studied fluctuation effects of $YBa_2Cu_3O_{7-\delta}$ thin films around T_c by doing frequency-dependent microwave conductivity and DC nonlinearity measurements. The length scales involved in the measurements and their influence on the fluctuation conductivity have been examined systematically, and this helps to clarify the historical discrepancy between experimental results and scaling predictions. Our results give a dynamical scaling exponent $z = 1.55 \pm 0.15$, which indicates the superconducting to normal phase transition of high-T_c materials likely belongs to the model E-dynamics.

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