Microwave study of influence of trapped vortices on intergrain weak links in Eu−123 ceramics

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The following sequence of actions on Eu−123 ceramic thin platelet was carried out in the experiment: zero−field cooling from $T>T_C$=90K to T=79K; raising the field to $H=H_A$ ($1Oe\leq H_A\leq 80Oe$); heating to $T=T_A$ ($79K\leq T_A\leq 93K$); returning backwards to T=79K, H=0; measuring the microwave absorption signal at T=79K, H=0 with switching on the field−modulating technique of an ESR−spectrometer; switching off the field modulation and heating to $T>T_C$ for making a new cycle with another T_A, H_A; and so on. The drastically different dependencies of the signal on H_A, T_A have been obtained for two orientations of the platelet's plane, parallel (case 1) and perpendicular (case 2) to external field: in the case 1 a three dimensional picture of the dependence displays a well outlined zero−signal plateau corresponding to Meissner states of the grains and a line of the signal's minima close to the T_C−line; in the case 2 the plateau is distorted while the minima become very pronounced and are found at significantly lower values of H_A, T_A. It is shown that both the two pictures can be explained by competitive influences of the trapped Abrikosov and Josephson type vortices on the critical currents of intergrain weak links. The grains' penetration fields also are discussed.