Stable and Unstable Thermo – Current States of High Temperature Superconductors During Current Charging

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Abstract – We discuss formation peculiarities of the stable and unstable states in high-Tc superconductors. To understand the basic physical trends, which are characteristic for the current penetration mechanism in high-temperature superconductors, we investigate theoretically the operating states of Bi2212 slab without stabilizing matrix placed in DC external magnetic fields at low coolant temperature. We prove that the temperature of a high-T_c superconductor is not equal to the coolant temperature before instability onset. Therefore, the voltage-current characteristic of a high-T_c superconductor has only a positive slope during continuous current charging. As a result, it does not allow one to find the boundary between stable and unstable thermo – current states. This has to be taken into account during experiments where the critical current of high-T_c superconductors is defined.

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