ELECTRODYNAMICS AND INTRINSIC JOSEPHSON EFFECTS IN MULTI-GAP SUPERCONDUCTORS

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The capacitively-coupled intrinsic Josephson junction model [1], which is used for the analysis of the intrinsic Josephson effects observed in highly-anisotropic high-Tc cuprates, is extended to the multi-junction systems composed of 2-gap superconducting layers with an atomic-scale layer thickness. In the 2-gap systems one can define two kinds of superconducting phase-differences between superconducting layers. The coupled dynamical equations for the phase-differences are derived from the effective Lgrangian in this system. We solve numerically the dyanmical equations and calculate the I-V characteristics. The phase-differences in the voltage state depend on the signs of the superconducting gaps (s++ or s+-). We also discuss the effect of the Leggett mode existing in multi-gap superconductors on the dynamics of the phase-differences.

References

[1] T. Koyama and M. Tachiki, *I-V characteristics of Josephson-coupled Layered superconductors wit longitudinal plasma excitations.* Phys. Rev. B, **54**, 16183 (1996)