



Contribution ID: 415

Type: Oral Presentation

## Parametric Resonance Features in the Coupled Josephson Junctions

*Friday, 15 July 2011 09:00 (15 minutes)*

A review of our last results on the phase dynamics of a stack of coupled Josephson junctions in layered superconductors is presented. The current voltage characteristics (CVC) of intrinsic Josephson junctions (IJJ) are numerically calculated in capacitively coupled Josephson junction model (CCJJ model) and CCJJ model with diffusion current (CCJJ+DC model). We discuss the features of the parametric resonance and its manifestation in the breakpoint region of CVC. We demonstrate the fine structure in CVC and investigate it by charge-charge and current-current correlation functions. The ideas concerning the experimental observation of the breakpoint features are considered. Charge creation in superconducting layers and nucleation of longitudinal plasma wave (LPW) for stacks with different number of junctions are predicted. Time dependence of the charge oscillations in the superconducting layers is analyzed at different values of bias current. We demonstrate the different time stages in the development of the LPW and present the results of FFT analysis at different values of bias current. The effects of noise in the bias current and the external microwave radiation on the charge dynamics of the coupled Josephson junctions are found. These effects introduce a way to regulate the process of LPW nucleation in the stack of IJJ. A role of diffusion current in the hysteretic behavior of coupled Josephson junctions is discussed. The superconducting, quasiparticle, diffusion, and displacement currents have been calculated as functions of the total current through the system. The role of the diffusion current in the formation of the CVC curves has been studied and its influence on the CVC curve branching and the magnitude of the return current has been revealed. The calculation results agree qualitatively with the experimental data.

**Level (Hons, MSc, <br> &nbsp; PhD, other)?**

PhD

**Consider for a student <br> &nbsp; award (Yes / No)?**

No

**Would you like to <br> submit a short paper <br> for the Conference <br> Proceedings (Yes / No)?**

Yes

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