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Can Shapiro step subharmonics be "charged"?

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Abstract content (Max 300 words) Formatting & Special chars

The system of superconducting layers found in high temperature superconductors (HTSC) such as $\text{Bi}_2\text{Sr}_2\text{CaCu}_2$ (Bi-2122) represent intrinsic Josephson junctions (IJJs). The locking of the Josephson oscillations (ω_J) of each junction of the IJJ to the frequency (ω_{ext}) of external electromagnetic radiation leads to the appearance at quantized voltages of the so-called Shapiro steps in the current voltage characteristics (IV-characteristics). Many devices in existence exploit this effect, notably voltage standards. Therefore, a detailed study of the Shapiro steps and their subharmonics in the intrinsic Josephson junctions at different resonance conditions presents important research questions with potential for different applications.

Using the capacitively coupled Josephson junction with diffusion current (CCJJ + DC model), we performed precise numerical study of phase dynamics of intrinsic Josephson junctions under external electromagnetic radiation. We survey the different Shapiro steps (SS) subharmonics found in these systems. We establish a link between the "charging" of superconducting layers in bias-current interval corresponding to SS subharmonics, and the existence of longitudinal plasma waves (LPW) in the system.

Apply to be considered for a student award (Yes / No)?

No

Level for award (Hons, MSc, PhD)?

N/A

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

Yes

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