

Numerical Study of Radiation Pattern from Intrinsic Josephson Junctions Attached to Finite Size Substrates

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We have numerically studied three dimensional radiation patterns from the mesa-structured intrinsic Josephson junctions attached to finite size substrates. We have considered a model that the mesa is attached to the substrate whose size is similar to that previously used in experiment ¹ and calculated the current and radiation intensity of the mesa as a function of voltage. Then, using this results, we have calculated far field radiation patterns from the mesa at the voltage where the mesa emits high intensity electromagnetic wave and observed the radiation patterns similar to the experimental results. From the similar calculations of radiation patterns for various sizes of substrates, we have found that the radiation pattern changes dramatically with the width of the substrates. This phenomenon can be understood by the diffraction effect at the substrate edges.

¹K. Kadowaki, M. Tsujimoto, K. Yamaki, T. Yamamoto, T. Kashiwagi, H. Minami, M. Tachiki, and R. Klemm, J. Phys. Soc. Jpn. **79**, 023703 (2010).