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THz wave emission from intrinsic Josephson junctions in in-plane magnetic fields controlled by surface impedance YOSHIHIKO NONOMURA, Computational Materials Science Center, National Institute for Materials Science, Tsukuba, Ibaraki 305-0047, Japan — Since THz wave emission from intrinsic Josephson junctions without external magnetic fields was observed experimentally,[1] possible emission states have been discussed theoretically. My recent numerical simulations [2] revealed that both in-phase McCumber-like state and symmetry-breaking π-phase-kink state can be stable as the surface impedance Z is varied. Quire recently effects of in-plane magnetic fields are about to be observed in the same samples used in experiments without external fields, and preliminary results still look controversial. In the present study such systems are investigated numerically, and Z is also found out to be essential. When in-plane field is applied to the π-phase-kink state, two-step dynamical phase transitions to the incommensurate-phase-kink state (artifact due to small number of layers used in simulations) and in-phase state (independent of number of layers) occurs. Up to $Z \approx 40 \sim 50$ the onset field of the in-phase state is small and a characteristic peak in emission intensity is obvious, while for larger Z this onset field shifts to larger values and emission intensity decreases monotonically as the field increases, which resolves controversy.
[1] L. Ozyuzer *et al.*, Science **318**, 1291 (2007); K. Kadowaki *et al.*, Physica C **468**, 634 (2008). [2] Y. N., PRB **80**, 140506(R) (2009).

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