Microwave scattering on single one-dimensional array of Josephson junctions as a point defect in standing wave regime

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In this work, microwave scattering experiment was performed on one-dimensional(1D) arrays of Josephson junctions, which exhibited magnetic field-tuned superconductor-insulator transition as a point defect in a rf/microwave waveguide. The waveguide presented a standing wave nature of a period in frequency of 240 MHz, similar to a Fabry-Perot interferometer with a low coefficient of finesse. Because the 1D array is oriented in parallel to the polarization of rf/microwave, a larger coupling between rf/microwave photons and the 1D array was obtained. As such the 1D array gave rise to stronger rf/microwave absorption when the array is in superconduting state, resulted in an oscillatory modulation of rf/microwave transmission amplitude in magnetic field dipped at zero magnetic field. For the phase shift, the oscillation evolved from in-phase to out-of phase when the rf/microwave frequency was swept from one transmission maximum to the adjacent one.