Observation of Little-Parks Oscillations of the Kinetic Inductance at Low Temperatures Using a GHz Resonator with Two Parallel Superconducting Nanowires\textsuperscript{1} ANDREY BELKIN, MATTHEW BRENNER, THOMAS AREF, JASEUNG KU, ALEXEY BEZRYADIN, University of Illinois at Urbana-Champaign — Little-Parks (LP) effect manifests the phenomenon of the fluxoid quantization in doubly connected superconductors. Usually it is observed at high temperatures, i.e. slightly below the critical temperature ($T_c$). We demonstrated that a thin-film Fabry-Perot superconducting resonator with a pair of nanowires inserted at the point of supercurrent antinode can be used to reveal LP effect even at temperatures much lower than $T_c$. As magnetic field ($H$) is applied, the Meissner current develops, changing the kinetic inductance of the wires and, correspondingly, the resonance frequency of the resonator and its transmission $S_{21}$ measured at the fixed frequency. The periodicity of the LP effect is revealed as a periodic set of distorted parabolas $S_{21}(H)$ corresponding to the states with different vorticities. The transition from one state to another corresponds to a Little’s phase slip. We suggest a theoretical explanation to the shape of the observed parabolas. We also report a statistical analysis of the jumps between the parabolas.

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