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Lorentzian crater in superconducting microwave resonators with inserted nanowires ALEXEY BEZRYADIN, MATTHEW W. BRENNER, SARANG GOPALAKRISHNAN, JASEUNG KU, University of Illinois at Urbana-Champaign, NAYANA SHAH, University of Cincinnati, PAUL M. GOLDBART, University of Illinois at Urbana-Champaign — We report on observations of nonequilibrium pulsing states in microwave (i.e., GHz) coplanar waveguide(CPW) resonators consisting of superconducting MoGe strips interrupted by a trench and connected by one or more suspended superconducting nanowires. The Lorentzian resonance peak shows a "crater" when driven past the critical current of the nanowire, leading to a "pulsing" state. In the pulsing state, the supercurrent grows until it reaches the critical current, at which point all stored energy quickly dissipates through Joule heating. We develop a phenomenological model of resonator-nanowire systems, which explains the experimental data quantitatively. For the case of resonators comprising two parallel nanowires and subject to an external magnetic field, we find field-driven oscillations of the onset power for crater formation, as well as the occurrence of a new state, in which the periodic pulsing effect is such that only the weaker wire participates in the dissipation process.

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