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Stochastic resonance in a periodic superconducting array MAXIM MARCHEVSKY, MICHAEL DEFEO, Syrcause University, VITALI METLUSHKO, University of Illinois at Chicago — Magnetic fluxon dynamics was studied in superconducting Nb films patterned with a periodic array of holes. A sum of weak harmonic and Gaussian white noise magnetic fields is applied to the sample at $T \ll T_c$ and the local magnetic response is measured with a scanning Hall sensor. We find that the fluxon jump rate in the array exhibits locking with the half-period of the harmonic magnetic drive at a certain "optimal" non-zero amplitude of the white noise. Peaks in the resident time distribution and formation of the quasi-periodic flux patterns is observed. We explain our observations with the phenomenon of array enhanced stochastic resonance earlier seen in various driven non-linear systems with dynamic threshold. Implications of our results for the fluxon-based superconducting devices will be discussed.

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