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Synchronization of Coupled Josephson Junctions[1] ZIJIE POH, Ohio Wesleyan University, MA'AYAN DAGAN, Oberlin College, BRAD TREES, Ohio Wesleyan University — We study numerically the phase dynamics of coupled Josephson junctions in one and two plaquettes. The governing coupled, nonlinear equations are solved via the fourth order Runge-Kutta method. We look for evidence of both frequency and phase synchronization in the dynamic (oscillating) junctions of the plaquette(s). Frequency synchronization is attained when the phase difference of the dynamic junctions is independent of time. Phase synchronization is attained when the phase difference of the dynamic junctions is zero. We found that, for a single plaquette, frequency synchronization can be attained rather easily with even weak coupling of the horizontal junctions, while phase synchronization is attained asymptotically as the coupling is increased. For two plaquettes, frequency synchronization between horizontal junctions in neighboring plaquettes can be attained when a magnetic field is applied perpendicular to the plane of the plaquettes. The frequency synchronization is weak in that it is lost as the bias current driving the plaquettes is increased. Analysis of the phase synchronization of the dynamic junctions in a two-plaquettes array is in progress.

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