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Tunneling of a modulated oscillator: quantum interference in the classically forbidden region MICHAEL MARTHALER[1], MARK DYKMAN, Michigan State University — We describe a new coherent quantum effect in periodically modulated systems. It occurs in a modulated nonlinear oscillator and has no analog in two-level systems. The effect consists in oscillations and sign change, with the varying modulation frequency, of the tunnel splitting of the symmetric and antisymmetric time-periodic states. These states are formed by period-2 oscillator states, which classically have the same amplitudes and opposite phases. The effect is due to the wave function oscillations and the related interference in the classically forbidden region of the oscillator phase space. The tunnel splitting oscillations emerge already in the "ground state" of the oscillator Hamiltonian in the rotating frame. The WKB analysis in the rotating wave approximation is in excellent agreement with the numerical results. The tunnel splitting oscillations persist in the parameter range where the rotation wave approximation becomes inapplicable. The effect occurs in the parameter range accessible with currently available Josephson junction-based systems.

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