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Revisiting the Mode-Beating Model of AC Helicity Injection[1] J.P. SAUPPE, C.R. SOVINEC, Univ. of Wisconsin-Madison — Oscillating field current drive (OFCD), or AC helicity injection, is an important candidate for current sustainment in reversed-field pinch devices. Bellan examined AC helicity injection in a slab geometry and described it as a beating between two plasma modes that produces a mean current parallel to the equilibrium magnetic field [P. M. Bellan. Phys. Rev. Lett. 54, 1381 (1985)]. This mean current is confined to within a classical resistive skin depth of the plasma surface, and plasma relaxation is responsible for transporting this current to the core. We revisit this analytical work and examine how this wave-beating effect is represented in zero-beta MHD simulations, including consideration of the choice of boundary conditions. In addition to the expected parallel current, numerical simulations show a pinch effect from a cycle-averaged current that is perpendicular to the mean magnetic field, which is not described in Bellan's original work. Our results are discussed with respect to Boozer's general anti-dynamo theorem [A. H. Boozer. Phys. Fluids B Vol. 5, 2271 (1993)].

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Carl Sovinec
Univ. of Wisconsin-Madison

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