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Driven Poloidal Spin-Up with Rotating Magnetic Field

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A driven plasma poloidal spin-up scheme is proposed. A combination of toroidal curvature and weak non-linearity induce axisymmetric poloidal rotation when a tokamak plasma is driven by a rotating poloidal magnetic field. The analysis presented here first shows that a circular cross-section plasma undergoing a stable axisymmetric vertical oscillation "twists" poloidally when first order in inverse aspect ratio curvature terms are retained in the mode's description. A simple argument shows that at nonlinear mode amplitudes a plasma shell with a poloidally rotating center of mass acquires a toroidal component of angular momentum about the center of mass.