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Wobbler Dynamics for Heavy Ion Fusion Drivers MICHAEL HAY, University of California, Berkeley, RONALD DAVIDSON, HONG QIN, Princeton Plasma Physics Laboratory — HIFS-VNL is reviewing beam wobbler methods for NDCX upgrades in addition to future heavy ion fusion and high energy physics applications. The wobbler system will smooth the ion beam and deposit its energy uniformly about an annular region on the target, consequently mitigating the Rayleigh-Taylor instability. The wobbler's two pairs of RF-driven electrode plates form this annular structure by accelerating different axial slices of the incident beam in appropriate transverse directions. A lattice of quadrupole magnets will then reduce the focal size of each slice. The coupled, nonlinear ODE system describing the centroid and envelope dynamics through the wobbler and final focusing magnets has been derived for an elliptic beam of uniform density in axial cross-section. Multidimensional Newton methods identified electrode and lattice configurations yielding sufficient deflection and convergence. In the case of a 1 kA, 50 MeV Ar^+ incident beam, an Adams-Bashforth-Moulton integrator was used to analyze the dynamics of an infinitesimal slice and estimate design parameters for deflection and transverse compression both with and without self-field effects. Leading-order results have indicated feasible requirements for the wobbler voltages and quadrupole gradients.

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