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An Adaptive Sparse-Grid Fokker-Planck Approach toRF Heating of Plasmas in Magnetic Mirrors[1] LOUIS WONNELL, JUAN CANESES, DAVID GREEN, DIEGO DEL-CASTILLO-NEGRETE, LIN MU, EDUARDO D'AZEVEDO, TYLER MCDANIEL, HARRY HUGHES, Oak Ridge National Lab — The application of RF power to heat or control plasmas in magnetic mirror devices, together with losses at the device ends results in distribution which deviate from Maxwellian and requires kinetic simulation for quantitative prediction. However, as spatial dimensionality is added to the required 2 velocity dimensions, the Fokker-Planck equation describing the dynamics becomes more challenging to solve within available computational resources, especially for continuum / Eulerian (mesh-based) approaches. For this work, the merits of an adaptive sparse-grid approach are discussed in the context of the RF heating of plasma in a magnetic mirror configuration for a three-dimensional phase space involving two velocity dimensions and one spatial coordinate along the magnetic field line. This continuum approach is compared with Monte Carlo-based Fokker-Planck calculations and experimental data to determine the effectiveness and cost savings of the approach.

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