Volterra Integral Equation Method for Linearized Electron Plasma Wave Dynamics Including Temporal Echoes.[1] JON WILKENING, ROCKY SISSON, University of California, Berkeley, BEDROS AFEYAN, Polymath Research (United States) — We solve the Volterra/Penrose integral equation formulation of the linear kinetic plasma wave response problem using a spectrally accurate and efficient Chebyshev collocation method. The solution is represented by Fourier modes in space and either Hermite polynomial expansions in velocity space or by evaluating a reconstruction formula that can be computed rapidly at any desired set of velocity points, once the plasma density's evolution in time is known by solving the Volterra/Penrose equation. The resulting integral equation is solved to very high accuracy but efficiently. We show the interplay between ballistic modes, the Landau solution and temporal plasma wave echoes both with stable (single hump) and unstable (double hump) initial electron velocity distribution functions. The advantage of the numerical method used is that it can handle very large contrast or large dynamic range in the solution while maintaining arbitrarily high accuracy.

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