Numerical Plasma Dispersion Relation Solver

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PDRK: A General Kinetic Dispersion Relation Solver for ...

Controlling the Numerical Cerenkov Instability in PIC ... Numerical dispersion relation Coupling term Langmuir mode EM mode in the continuous limit X. Xu, et al. Computer Physics Communications 184 (11), 2503-2514 (2013). ... numerical dispersion bumping for HO FDTD solver.

GitHub - dtold/HYDROS: A dispersion relation solver for ...

The dispersion relation for each μ and ν 1 is the product of the dispersion relation of these two modes set equal to a coupling term that vanishes in the continuous limit. The new form of the numerical dispersion relation provides an accurate method of systematically calculating the growth rate and location of the mode in the fundamental Brillouin zone for any Maxwell solver for each μ and ν 1 .

Controlling the Numerical Cerenkov Instability in PIC ...

New Hampshire Dispersion relation Solver (NHDS) is a numerical tool written in Fortran 90 and first introduced by Verscharen et al. (2013) to solve this dispersion relation under the assumption that the plasma background distribution is a gyrotropic drifting bi-Maxwellian for each species j,

Numerical Plasma Dispersion Relation Solver

Abstract A general, fast, and e fi ective approach is developed for numerical calculation of kinetic plasma linear dispersion relations. The plasma dispersion function is approximated by J-pole expansion. Subsequently, the dispersion relation is transformed to a standard matrix eigenvalue problem of an equivalent linear system. Numerical solutions for the least damped or

Plasma Dispersion Relation and Instabilities in Electron ...

A particular generalization of the plasma dispersion function, which is linked to the regular plasma dispersion function via recurrence relations is

discussed. The generalization allows a fast numerical implementation of a certain two-dimensional integral...

Hua-sheng Xie's articles on arXiv

A unified numerically solvable framework for dispersion relations with arbitrary number of species drifting at arbitrary directions and with Krook collision is derived for linear uniform/homogenous...

A Unified Numerically Solvable Framework for Complicated ...

The Arbitrary Linear Plasma Solver (ALPS) is a parallelized numerical code that solves the dispersion relation in a hot (even relativistic) magnetized plasma with an arbitrary number of particle species with arbitrary gyrotropic equilibrium distribution functions for any direction of wave propagation with respect to the background field.

PDRK: A General Kinetic Dispersion Relation Solver for ...

A dispersion relation solver for the hybrid-kinetic model of plasma physics. ===== HYDROS === HYbrid Dispersion RelatiOn Solver ===== The HYDROS code is intended to enable an easy-to-use interface for obtaining solutions of the hybrid-kinetic dispersion relation. The derivation of the model is described in Told et al.

PDRK: A General Kinetic Dispersion Relation Solver for ...

A general, fast, and e ective approach is developed for numerical calculation of kinetic plasma dispersion relations. The plasma dispersion function is

approximated by J-pole expansion. Subsequently, the dispersion relation is trans-formed to a standard matrix eigenvalue problem of an equivalent linear system. The result is accurate for J = 8

Cutting-edge Kinetic Physics with Parker Solar Probe and ...

A general, fast, and effective approach is developed for numerical calculation of kinetic plasma linear dispersion relations. The plasma dispersion function is approximated by J -pole expansion. Subsequently, the dispersion relation is transformed to a standard matrix eigenvalue problem of an equivalent linear system.

Implement a dispersion relation solver · Issue #11 ...

writing a code of a numeric dispersion relation solver, hence the new ndings can be expected in subsequent papers. Dispersion relation Dispersion relation provides a relationship between the wave vector and the frequency of a wave and describes under which conditions the wave can propagate and under which conditions it cannot propagate.

NHDS: The New Hampshire Dispersion Relation Solver ...

Dispersion occurs when pure plane waves of different wavelengths have different propagation velocities, so that a wave packet of mixed wavelengths tends to spread out in space. The speed of a plane wave, v, is a function of the wave's wavelength : = (). The wave's speed, wavelength, and frequency, f, are related by the identity = ().The function () expresses the dispersion relation of the ...

ALPS: the Arbitrary Linear Plasma Solver

A general dispersion-relation solver that numerically evaluates the full propagation properties of all the waves in fluid plasmas is presented. The effects of anisotropic pressure, external magnetic fields and beams, relativistic dynamics, as well as local plasma inhomogeneity are included.

Numerical computation of the modified plasma dispersion ...

A general dispersion-relation solver that numerically evaluates the full propagation properties of all the waves in fluid plasmas is presented. The effects of anisotropic pressure, external magnetic fields and beams, relativistic dynamics, as well as local plasma inhomogeneity are included.

Elimination of the numerical Cerenkov instability for ...

A general, fast, and effective approach is developed for numerical calculation of kinetic plasma linear dispersion relations. The plasma dispersion function is approximated by J-pole expansion. Subsequently, the dispersion relation is transformed to a standard matrix eigenvalue problem of an equivalent linear system.

PDRF: A general dispersion relation solver for magnetized ...

Numerical calculation of the plasma dispersion function (PDF) Z()] using different methods and the comparison with Fried and Conte ' s book [Fried1961] is discussed or listed. The application to get the exact solution of dispersion relation is also mentioned. The PDF is well-known in the plasma community.

Numerical Plasma Dispersion Relation Solver
Our numerical dispersion relation solver offers simplified dispersion relation functions for parallel propagation of electrostatic (7) and electromagnetic waves (6), parallel propagation of electrostatic waves with Maxwellian distribution functions of particles (10), and a general form

solve numerically a nonlinear (plasma wave dispersion ...
The Arbitrary Linear Plasma Solver (ALPS) is a parallelised numerical code that solves the dispersion relation in a hot (even relativistic) magnetised plasma with an arbitrary number of particle species with arbitrary gyrotropic equilibrium distribution functions for any direction of wave propagation with respect to the background field.

On Numerical Calculation of the Plasma Dispersion Function
When dealing with plasma waves, it would be helpful to have a dispersion relation solver. This was recommended by John Raymond. I believe Carl Sovinec wrote a code that this several years ago, though not in python.

PDRK: A General Kinetic Dispersion Relation Solver for ...
I'm currently trying to solve numerically the following nonlinear (dispersion) relation (i.e. wave frequency f or pulsation omega, as a function of wave number k_B) with 8 fixed parameters: that should have 3 solutions (red, light blue and orange curves), according to the

following plot: