Oberseminar Mathematische Strömungsmechanik

Institut für Mathematik der Julius-Maximilians-Universität Würzburg

Hyperbolic equations - structure preserving methods & other topics

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A new grazing collision approximation to the Boltzmann collision operator for plasmas

Abstract:

In collisional, kinetic plasmas, the collective effect of grazing collisions allows the Boltzmann collision operator to be approximated by the Landau, or Landau-Fokker-Planck operator. We revisit this derivation and observe that the small angle cutoff typically used in this approximation can also be modeled with a velocity dependence. We apply a spectral formulation to the modified Boltzmann operator and derive a new, modified Landau collision operator which now includes a velocity dependent, rather than constant, Coulomb logarithm $CL(|u|)$. We also derive the rate of convergence of the grazing collision approximation within this spectral framework in terms of the plasma coupling parameter Γ. We present some preliminary numerical results as well as details related to the numerical implementation of the spectral method.

via Zoom video conference (request the Zoom link from klingen@mathematik.uni-wuerzburg.de)

Friday, Mar.. 12 at 3 pm CET

Zu diesem Vortrag sind Sie herzlich eingeladen.

gez. Christian Klingenberg