

Autore:

Marco Cavenago
Istituto Nazionale Fisica Nucleare INFN
Laboratori Nazionali di Legnaro

Titolo:

Transport equation solution for 1D magnetized plasma and status of the extraction model.

Abstract:

A particular class of transport problem, related to electron transport and extraction along the direction z in transversely magnetized plasmas, with a given scattering background, gives rise to integrodifferential equation for the current $j(z)$; in a first analysis, plasma is assumed uniform in x and y dimension, while a weak electric field E_z may exist; these models are called onedimensional(1D). With reasonable simplifying assumptions and in particular cases, some solutions can be obtained in analytic form, but the required manipulations are complicated, and clearly benefit from execution with Mathematica.

Moreover numerical verification of the solution found is necessary at several steps, and is greatly simplified using the Mathematica plotting and integration primitives. Once the electron and ion density are approximated by some law based on the previous transport theory, the extraction velocities and electric potential $v(z)$ for 1D problems can be determined by ordinary differential equation systems, plotted from the NDSolve solution.