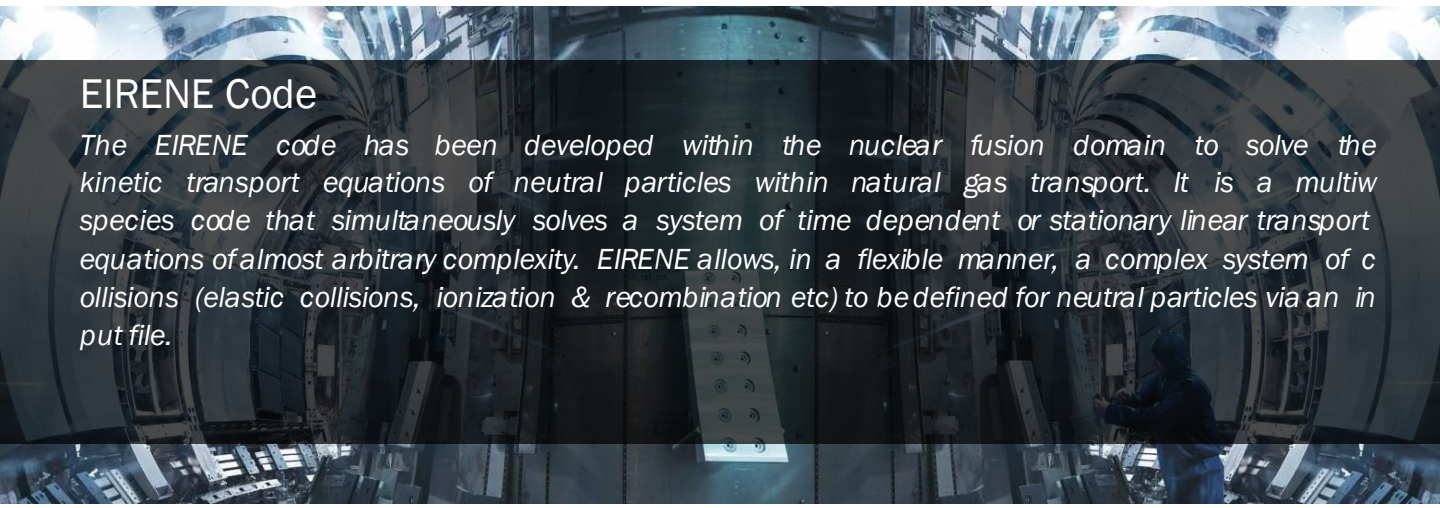

EIRENE Code

The EIRENE code has been developed within the nuclear fusion domain to solve the kinetic transport equations of neutral particles within natural gas transport. It is a multiw species code that simultaneously solves a system of time dependent or stationary linear transport equations of almost arbitrary complexity. EIRENE allows, in a flexible manner, a complex system of c ollisions (elastic collisions, ionization & recombination etc) to be defined for neutral particles via an in put file.

Description of the technology

EIRENE is a code that has been developed within the nuclear fusion industry in order to solve the kinetic transport equations of neutral particles within a Tokomak's plasma. It is a multiw species code that simultaneously solves a system of time dependent or stationary linear kinetic transport equations of almost arbitrary complexity.

EIRENE allows, in a flexible manner, a complex system of collisions (elastic collisions, ionization & recombination etc.) to be defined for neutral particles via an input file. This allows not only for transport simulations of neutral gas particles (atoms or molecules) to be processed but also the transport and absorption of photons. A crude model for the transport of ionized particles along magnetic field lines is also included. EIRENE is coupled to an array of external databases that supply it with atomic and molecular data as well as surface reflection data.

The main goal of the code development was to provide a tool to investigate neutral gas transport within magnetically confined plasmas meaning that it is also applicable in other situations outside of nuclear fusion.

Innovation and advantages of the offer

- Flexibility of the code,
- Multi--species code that can simultaneously solve kinetic neutral transport equations,
- Can also simulate the transport and absorption of photons,
- Can be used to solve more general linear kinetic transport equations, by applying a stochastic rather than a numerical or analytical method of solution

Non-fusion Applications

EIRENE was developed to investigate neutral gas transport in magnetically confined plasmas. Applications where this is relevant include:

- Shielding of spacecraft from cosmic radiation
- Electric propulsion of spacecraft/satellites

Visit our website to learn how fusion can help your business
www.tech-transfer.eurofusion.eu

This work has been carried out within the framework of the EUROfusion Consortium and has received funding from the Euratom research and training programme 2014-2018 and 2019-2020 under grant agreement No 633053. The views and opinions expressed herein do not necessarily reflect those of the European Commission