Seminar

Institute for Plasma Research

Title : NDOT-1D: A MATLAB code for preparation & execution of Monte Carlo transport code input files for 1-D radial model of fusion reactors

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Date: 3rd July 2019 (Wednesday)

Time: 3:00 PM

Venue: Seminar Hall, IPR

Abstract:

The process of designing any new fusion reactor involves estimation of initial parameters (e.g. dimension, material composition etc.) of various components based on conformity to certain standards of structural, performance and economic requirements. These studies are essentially iterative in nature, where the initial estimations, based on various physics & design requirements, are successively revised based on other design constraints (e.g. neutronics, thermal hydraulics etc) to arrive at a working definition. As far as the neutronics design and optimization is concerned, Monte Carlo based radiation transport tool has been the preferred code for this kind of study. Here, one need to prepare an input file containing the geometry, material and source information, along with the kind of tally needed, which is then processed by the Monte Carlo code to generate the results. As the input file typically run into hundreds of lines, and one need to manually edit the file to enter various information, it's a tedious and human labor intensive work with scope of error.

Neutronic Design and Optimization Tool (NDOT-1D) is a newly developed code (MATLAB-based) that simplifies the Monte Carlo code based neutronic scoping and parametric studies of 1D radial build of fusion reactors. Specifically, it *semi*-automates the Monte Carlo code input file preparation process by using formatted input data from an excel file to automatically generate the CELL, SURFACE and MATERIAL cards for the Monte Carlo input file. Further, a GUI helps the user to finalize and write down the SOURCE and TALLY specifications of the problem. Recently, we have completed the Phase –I modification of this code, and the code is now capable of fully automated Monte Carlo input file generation (and execution) for the 1D model based on initial user input from a formatted Excel file. It also has the provision for batch generation (and execution) of input files, where instead of a single value, the user can provide more than one value for dimension and/or material composition of different sections, and the program then generates (and executes) all the required Monte Carlo input files at once. In this talk, main features and working of the code will be discussed.