

## **Dynamic coupling of radiation transport code MCNP-X and one-dimensional H-isotopes' transport code TMAP7 for neutron source and tritium transport coupled analysis**

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For the case of H-isotopes, once MeV implanted ion stopped-down in a given bulk material the particle thermally diffuses as solute. In these conditions the impinging source of particle “reacts” dynamically with the thermally transported (diffusing) one.

The spectra of the impinging/implanting stopping ion can be in the range of the maximum or non-negligible values of the nuclear reaction fusion cross-section. Thus, the reaction of the deuterium/tritium impinging, stopping down and implanting as ion with the pre-implanted and thermally diffusing solute can represent an extra additional source of neutrons with dosimetric impact.

Our work takes two reference benchmarked transport tools (MCNPX for radiation transport, SRIM2009 for ion stopping and TMAP7 for solute bulk/surface transport) and couple executables dynamically with a specifically developed VBA batch interface in order to be able to model dynamically this coupling effect.

A second order coupling can arise from own the effect neutron source on the modification of material's bulk and therefore H-isotopes transport properties.

As application results the contribution or correction this coupling effect is assessed for the list of component and systems of potential interest in fusion technology: 1) first wall of DD, DT reactors as ITER or DEMO, 2) Residual Ion Dump NBI Cu-alloy plates in ITER, 3) T targets neutron sources (reference standard HV 2 D- MeV lines) 4) mA D+ ion beam currents at lines implantation derives IFMIF accelerator lines (SS, Nb) or 5) Ion Dump target in IFMIF.

The coupling tool is presented, numerical analysis reported and results discussed.