D, V and flux $\tilde{\Gamma}$ in IDS and CPO (ETSv5)

The total flux through a flux surface is an invariant quantity under coordinate transformations (scalar): The JINTRAC/TASK fro nthe previous slide is consistent with IDS defintions and consistent with both rho_tor and rho_tor_norm as the ”rho” grid.

$$\Gamma V' = < \vec{\Gamma} \cdot \nabla\rho > V' = \left[-D \frac{\partial n}{\partial \rho} < |\nabla\rho|^2 > + nV_p < |\nabla\rho| > \right] V'$$

here $\Gamma V' = \tilde{\Gamma} A; \, and \, V' < |\nabla\rho| >= A$. A is the Surface area of the flux surface labelled by ρ. I.e., we are expressing the flux through the contravariant component of the flux. This is the proposed interpretation in IDS and assumed meaning in CPOs.

However ETS is using a different internal representation.

$$\Gamma V' = \left[-D \frac{\partial n}{\partial \rho} + \, nV_p \right] < |\nabla\rho|^2 > V'$$

In the CPO world this has lead to an inconsistent convention where TCI and modtransp routines are providing V_p according to the internal repesentation which is not fully consistent with the CPO definition. Fluxes are not provided in coretransp (not yet converted in transport combiner).

Hence the V_p term need to be multiplied with $< |\nabla\rho|^2 > / < |\nabla\rho| >$ when compared to IDS (and formal CPO) definitions.

The use internal to ETSv5 is consistently done.