DIII\_D has gone thru several cryopump phases: 1) ADP, 2) RDP, 3) Divertor 2000, 4) Lower div. baffle extension 2007

ADP (loower divertor)

The original DIII-D lower div. cryopump ("ADP") was designed with a range of tools; DEGAS was used to compute the neutral transport. A decent overview of all aspects of this design is given in

Menon, et al., Fusion Tech. 22 (1992) 356.

I only have a hardcopy and can't easily find an e-copy - maybe someone else can? The particle exchaust modeling is given in:

Mioduszewski, et al., JNM 176 (1990) 733 (attached)

Mechanical design is given in (ditto - only a hardcopy of this)

Smith, et al., Fusion Tech. 21 (1992) 1658.

An early experimental study before the cryopump, e.g. baffle only, is given in:

Klepper, et. al., 33 (1993) 533 (attached)

Years later, I published calculations of the expected plenum pressure buildup from a first flight model:

Maingi, et al. Nucl. Fusion 39 (1999) 1187 (attached)

RDP (upper divertor)

The upper divertor cryopump physics design was done by UEDGE/DEGAS calculations, with the figure of merit being the reduction in core ionization source:

Allen, et al., JNM 266 (1999) 168. (attached)

There is a reference to UEDGE calcs. by Wolf at the same PSI conf., but I can't seem to find that paper. There is an earlier paper with brief comments on this:

Fenstermacher, JNM 220 (1995) 330. (attached)

Divertor-2000 (3 pumps)

The first overviews of divertor 2000 (upper inner pump, reduced tile-tile misalignment) is given in:

Allen, et. al., JNM 290 (2001) 995 (attached)

Mahdavi, et al. JNM 290 (2001) 905 (attached)

I did pump plenum calcs for each of these new plenums:

Maingi, et al. NF 44 (2004) 909 (attached)

Divertor 2007

I don't think anyone did comparisons of effect of Div. 2007 shape change with models - focus had shifted to other areas. There is a paper on this by Unterberg 50 (2010) 34011 (attached), which is only peripherally related.

Here is a summary of different aspects of the problem, i.e. options, from my viewpoint:

1. UEDGE/DEGAS and/or SOLPS can do the problem in terms of predicted change of core fueling with pumping, including pressure buildup, exhaust rate, etc.; need some method to project new density profile given this, i.e. core transport code

2. Given the SOL ne, Te, and particle flux profiles and equilibria, my analytic model can compute the expected height as a function of plenum gap height, width, flux expansion, etc. - useful for lots of design calcs., and then final can be confirmed with 2-D calcs

3. I have a core fueling model that I previously applied to DIII-D, based on the pump efficiency estimates; that should provide an estimate of edge density reduction.

Regards,