Boundary working group simulations of IGNITOR

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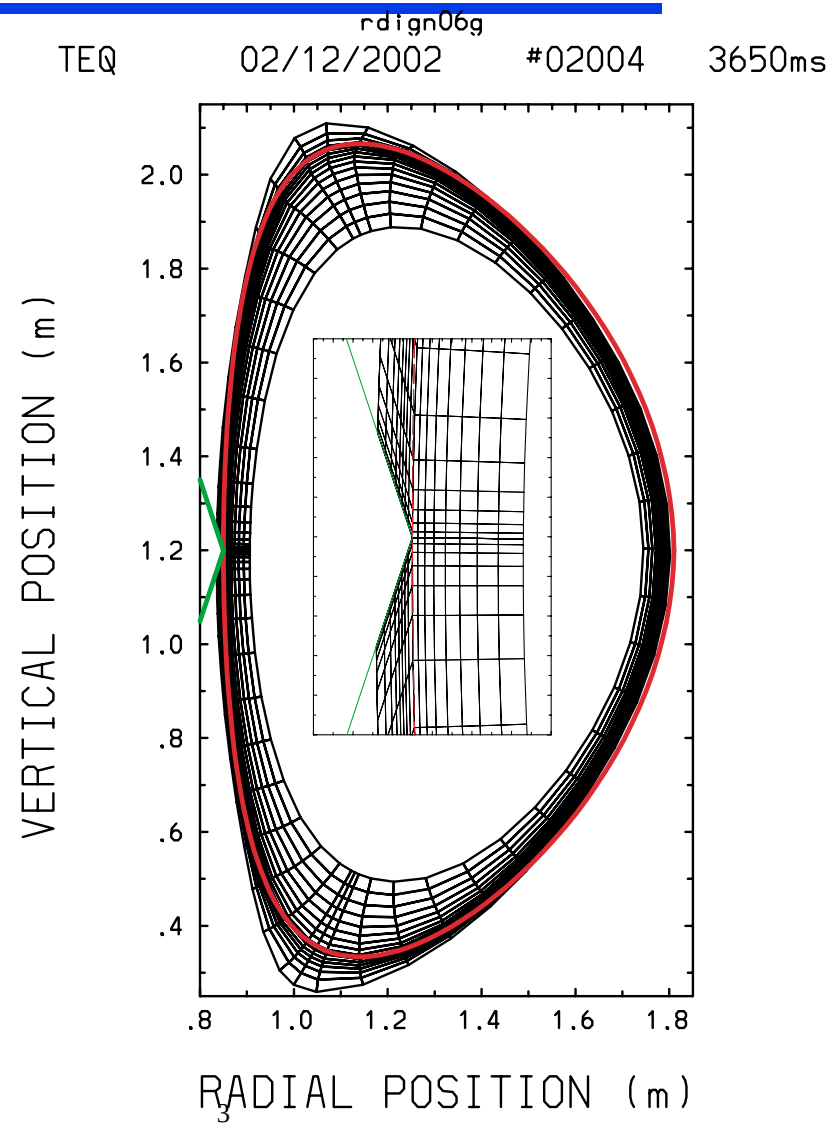
Assessment technique

- Boundary plasma character determined using UEDGE
- Principle question addressed was evaluation of peak exhaust power heat flux
- Wedge limiter was extrapolated to wetted area of IGNITOR wall
- Alternate conformal wall limiter was examined
- High Z concern examined using DIVIMP

IGNITOR wall limiter approximated with wedge

- Angle of wedge varied to confirm peak limiter heat load scales with wetted area
- Alternate model with a conformal wall has been considered
  - Specify poloidal variation of radial scale length at “wall”

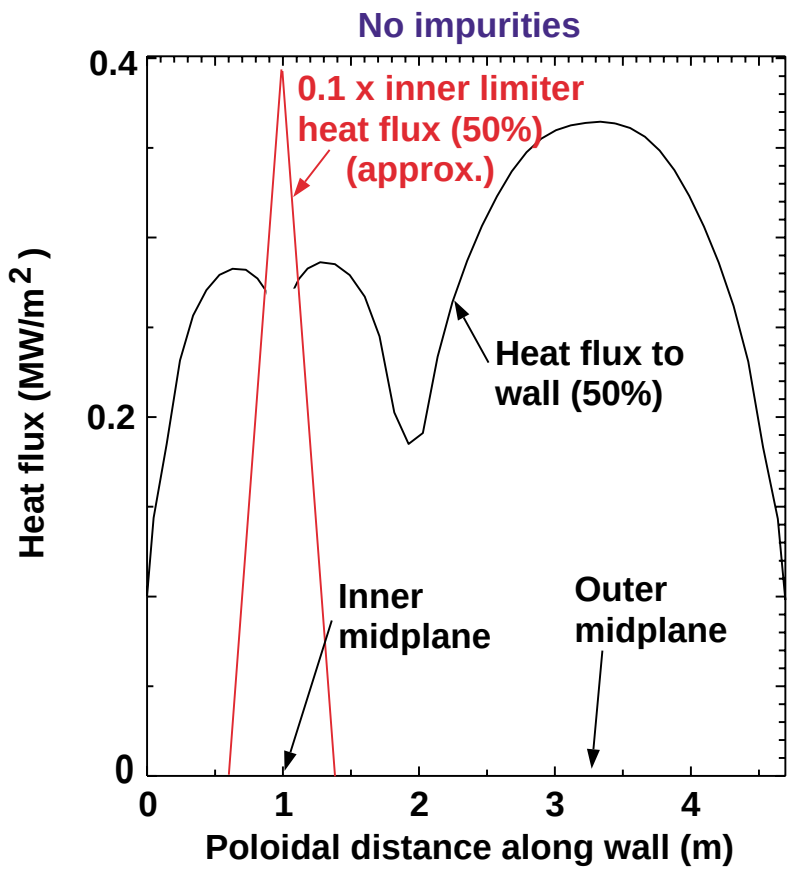


IGNITOR specific assumptions

- Power across separatrix 22 MW
- Density at innermost flux surface 2×10^{20} m^{-3}
- No particle removal
- Edge transport is D=1.0 m^2/s, χ=2.0 m^2/s
- Edge scale length specified for conformal wall approximation

Heat evenly split between inner limiter and wall

- Peak heat loads occur on inner limiter
- Half of exhaust power is delivered to wall
- Peak heat flux on wall is low
- Peak heat fluxes will be decreased by impurity radiation



Summary

- There are no issues which would argue for not building device, only concerns which should motivate studies on present devices
- Peak power flux appears to be within engineering capabilities (<2 MW/m^2 with 30% impurity radiation)
  - Peak power flux with conformal wall is about 1 MW/m^2

Areas of concern

- Effect of tile alignment has not been evaluated
- Some indication of MARFE formation with low Z impurities--localized heat source
- Effect of Mo sputtering from low Z impurities
- Not sure of sensitivity to flux surface variation due to changes in current profile