ARIES-CS Configuration Development
Action Items from ARIES-CS Meeting 5/7/03

Working Configurations

1. Evolve two working configurations for study with H=3 (J. Lyon)

    I.   Raise B-field of NCSX-8m to make it self-consistent
            (L-PK: R = 8.25 m, β = 4.1%, B = ~6.5-7.0 T, P_{fus} = 2 GW)

    II.   Move to larger size to gain margin in coil-plasma spacing:
            (JFL: R = 9.68 m, β = 4.1%, B = 5.7 T, P_{fus} = 2 GW)

2. Post new working configurations on web including appropriate caveats to emphasize the preliminary nature of these results (F. Najmabadi)

3. Update the above two-working configurations towards plasma topologies with < 10% alpha loss.

Physics Configuration Design

4. Explore coils for new configurations with attractive alpha confinement (L-P. Ku) . Explore Modular / TF / PF coil tradeoffs. Try to reduce or minimize TF's, then PF's. Increase openings for maintenance access.

5. Examine sensitivity of alpha loss to beta (L-P. Ku)

6. Estimate local alpha particle and heat fluxes (L-P. Ku)

7. Examine other magnetic topologies such as QH and drift-optimized configurations (fixed-boundary) (L-P. Ku)

8. Explore implications of β exceeding linear instability thresholds (Zarnstroff/Turnball). Look for equilibrium beta limits. (PIES). Nonlinear MHD stability

9. Divertors: wait for further progress on NCSX modeling of heat loads (next year) for a more accurate estimate. Can a very rough estimate be provided based on current extrapolation for heat loads and location? (Neilson/Zarnstroff)

10. What is the penalty of shaving off ~10 cm's toroidally in individual coils to facilitate access for sector maintenance (L-P. Ku)

11. What is the penalty of changing the number of field periods (e.g. going from 3-field to 2-field or 4-field periods) (L-P. Ku, P. Garabedian)

Engineering Effort

12. Provide a COE figure of merit to guide configuration design.
Function of β, B, R, R/a, R/$\Delta_{coil-plasma}$. (J. Lyon/L. Waganer)

13. Engineering criteria for optimizer: for maintenance, blankets, magnet (longer term)

14. Preliminary assessment of solutions for handling localized alpha particle and energy losses; need physics guideline on approximate loads (R. Raffray)

15. Develop at scoping level He-cooled solid breeder or liquid breeder modular blanket design (R. Raffray)

16. Explore in more details sector-like maintenance scheme (S. Malang)

17. Evolve at scoping level blanket design consistent with sector-like maintenance scheme (S. Malang)

** Address action items 15-17 in context of:
       a. 2 working configurations (larger size reactor)
       b. Higher-field feasibility (6 – 8 T)
       c. P. Garabedian's 2-field period configuration.

18. Coil questions to be confirmed (L. Bromberg)
    I.   Confirm thickness of winding pack+casing
    II.   Confirm radial center load and balance of toroidal forces between coils per field period
    III.   HTSC or LTSC