

C-MOD CRYOPUMP DESIGN AND ANALYSIS

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MIT, PSFC is in the process of designing and installing a cryo-pump in the Alcator C-MOD vessel. The cryopump will be used for density and impurity control during h-mode, ITB, and lower hybrid current drive operation on C-MOD. Performance goals are discussed in a companion paper at this conference on testing and installation. The mechanical design and analysis of the pump is presented in this paper. Significant loading includes differential contraction, pressurization due to up to an up to air fault in the vessel, disruption eddy currents, and halo currents in the tile shelf and supporting structures. The cold component support system is described and simulations of cooldown and pressurization are presented. Eddy currents are computed from a transient electromagnetic ANSYS simulation. This provides toroidal currents which in turn are input to a simulation of the pulse in which the cryopump disruption eddy currents are assumed to occur at any time in the pulse when there is a plasma. Cryopump eddy currents are treated as another poloidal coil current and loads on the pump are derived for all the points in the pulse. Uncertainties in the entry points of the halo current are discussed and loads and stresses on the tile shelf structure are calculated for worst case halo current distributions. Sizing of components and attachment details is presented.