Structure/DLDS Cooling

Nancy presented updated versions of two of her previous analyses - one representing the cooling of the current multi-moded DLDS design, and the other the cooling of accelerator structures. Keith Jobe has been assisting in the structure cooling design.

The DLDS calculations indicate that a pressure drop of 15-20 psi is fairly easily obtainable by going to relatively large (.5" ID) tubing, allowing the DLDS to be fed with the same water supply as the structures. This would eliminate the facility cost of an additional cooling circuit in the tunnel.

The structure calculations were done in the normal operating mode (the beam on and the RF on). They indicate that an acceptable metal temperature delta T from RF on to RF off, pressure drop, and water velocity can be obtained that will allow the electromagnets, structures, and DLDS to share the same water system. This design information was provided to Conventional Facilities for the CD 0.4 version of the NLC (NLC configuration presently being costed).

An additional row will be added to the analysis showing the temperature delta resulting from the beam going off while the RF remains on. The analysis is sensitive to the diameter conductivity factor, representing the amount of the pipe circumference that participates in the cooling of the structure. Nancy's nominal case sets this factor at 2.5 (if the full circumference participated the factor would be pi). Measurements in the NLCTA, whose accuracy is low, produce a diameter conductivity factor of 5, which on the surface appears questionable.

Nancy will check to see if the present cooling tube size (5/24 of an inch) is a standard pipe size. At a convenient time the water flow in the NLCTA will be checked to see if it is a counterflow design (water direction reversed in adjacent cooling tubes). The NLC design will be counterflow, so that the water temperature rise as it runs through a cooling tube is not a constrained factor.