

Cold Head Maintenance of GM Cryocoolers with Minimal Service Interruption

R. Verma, Nat'l Inst. of Tech., Jalandhar, India; H.N. Nagendra, G.A. Vivek, S. Kasthuriangan, U. Behera, Centre for Cryogenic Tech., Indian Inst. of Science, Bangalore, India; N.C. Shivaprakash, Instr. & Applied Physics, Indian Inst. of Science, Bangalore, India

Multistage GM Cryocoolers produce very low temperatures with large refrigeration powers. With the rare earth based regenerator materials, the cold head temperature gets extended below 4K. Further, in view of the orientation independent nature of GM Cryocoolers when compared to the PT cryocooler, they are being used extensively for cooling of superconducting magnets (SC). In particular, they are used for cooling the SC magnets of MRI systems starting from room temperature known as dry magnets. Although, refilling liquid helium at regular intervals and the associated infrastructures are avoided allowing the MRI systems to be operational continuously, the maintenance of the cryocooler need to be carried out at designated intervals. Hence, the MRI system has to be shut down causing the interruption of this medical diagnostic tool. It is desired to have the maintenance time periods as short as possible. In order to achieve the above, experimental studies on the cold swap maintenance on a two stage GM cryocooler have been carried out and their results are discussed here. In the above study, initially the GM cryocooler is made to cool an equivalent thermal mass simulating SC magnet. On switching off the cooler, heaters on cold heads warm up the cryocooler to ambient temperature. The temperature profiles of warm up of the cold head as well as the thermal mass have been studied with different heating methods. These results are analyzed to obtain the optimum heating procedure which leads to the shortest maintenance time for the GM cryocooler. The results of our preliminary experimental studies are presented here.