Development of High Current Nb_3Sn Rutherford Cables for NED and LARP

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LBNL has been developing Nb_3Sn Rutherford cables for two decades. Key findings from this experience are discussed in detail. Cable design optimizations determine a delicate balance between mechanical stability of the cable, required for magnet winding, and acceptable cable edge deformation. It is shown that the overall compaction in properly designed Nb_3Sn cables is less aggressive than allowable for NbTi cables. Moreover, the total packing factor of the cables has to be determined from independent width and thickness compactions. Otherwise severe edge deformation will occur which inevitably results in reduced operating current stability, and increased transverse pressure sensitivity of the cable. A good cable design, in contrast, enables the manufacture of record setting Nb_3Sn magnets.

This work was supported by the Director, Office of Science, High Energy Physics, U.S. Department of Energy under contract No. DE-AC02-05CH11231.