Development of a J-T Cryocooler Working at Liquid Helium Temperature

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This paper presents the development of a 4 K J-T cryocooler for applications such as cooling of superconducting magnets. A commercial two-stage G-M cryocooler was used as the pre-cooler. The J-T cycle was driven by modified linear compressors with three tube-in-tube counter-flow heat exchangers serving as recuperators. The analysis based on thermodynamics was given. Experimental study has carried out to investigate the dependence of cooling capacity on the supply pressure and pre-cooling temperature, etc, as well as the cooling-down characteristics of J-T cycle. Through optimization, a bigger cooling power may be achieved in the near future.