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C2Po2B-06 [12]: Design and experimental research of the cryogenic ejector to inject liquid nitrogen

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With the development of cryogenics, the demand of cryogenic liquid increases constantly. However, there are some difficulties to control and to adjust the extraction of cryogenic liquid especially for liquid helium. Compared with the immersed pump, the ejector has huge advantages in pumping the cryogenic liquid from cryogenic dewar, like stable operation and simple structure. Considering the similarity between liquid nitrogen and liquid helium and the high cost to conduct the liquid helium experiment, this paper reports a research on the cryogenic ejector in the nitrogen temperature range. The experiment platform customized for liquid nitrogen was set up and the experiment of injection was launched. The nitrogen gas, as the primary flow accelerating in the nozzle, injects the liquid nitrogen at the outlet of nozzle. Two flows blend in the mixing chamber and flow out from the diffuser. Based on the ideal gas assumption and energy conservation, the sound velocity can be derived from two kinds of equations, obtaining the critical condition of primary flow thermal properties. Depending on the properties and previous research experience, the structure of ejector is designed and established, which could effectively inject liquid nitrogen from the cryogenic liquid cylinder. The problems and challenges are analyzed. In conclusion, this paper introduces the design method of cryogenic ejector and builds a liquid nitrogen test instrument. This method makes the extraction of cryogenic liquid more convenient, which is of universal significance for the cryogenic research work.

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