

The Model of Calculating the Injection Mass on Single Screw Compressor

Yuting Wu^{1,2,*} and Qiangyu Wen^{1,2}

¹Moe Key Laboratory of Enhanced Heat Transfer and Energy Conservation and Beijing Key Laboratory of Heat Transfer and Energy Conversion, Beijing, 100124, China.

²College of Environmental and Energy Engineering, Beijing University of Technology, Beijing, 100124, China.

*Corresponding Author: Yuting Wu. Email: wuyuting1970@126.com.

The liquid refrigerant injection is an impactful measure to decrease discharge temperature and improve performance of single screw compressor by injecting liquid refrigerant into the working chamber. The modeling of calculating injection mass on single screw compressor is presented considering compression, main leakage and Exhaust reflux base on mechanism of injection of liquid refrigerant and compressive process. Injection area is significant factor to calculate injection mass, and accurate injection mass can foresee precisely exhaust temperature of compressor. The effective injection area can be received by the methods of integration and projection which means injection hole is projected onto the plane of star-wheel. This method is more credible than general method that injection area is calculated by assuming that the helix of rotor is line in injection hole and groove profile expansion diagram as the projection figure. The modeling applied to calculate mass flux is validate by experiment data base on single screw compressor with 147mm-diameter screw rotor in under six working condition. The comparison between theoretical calculation and experimental result illustrated that the error between them is less than 10 percent, so it can be considered that the model is able to calculate the amount of liquid mass.

Keyword: Single screw compressor; liquid injection; model

Acknowledgements: The authors are grateful for the financial support provided by the Beijing Municipal Natural Science Foundation (No. 3181001) and National Key R&D Program of China (No. 2016YFC0700403).