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Design and dynamic analysis of a novel double-swing vane compressor for electric vehicle air conditioning systems

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Highlights

- A novel double-swing vane compressor (DSVC) for electric vehicles is presented.
- Dynamic models of the DSVC were developed.
- The design of double-swing vanes bring about a larger work capacity for the DSVC.

Abstract

This paper presents a novel double-swing vane compressor (DSVC) for use in electric vehicle air conditioning systems. The design and work principle of the DSVC are introduced, and the dynamics and mechanical efficiency of the mechanism are theoretically formulated and analysed. **Under the same operating conditions and dimensions, the theoretical volumetric flow rate of the DSVC is about 1.6 times that of the swing vane compressor (SVC) with a single swing vane and the mechanical efficiency of the DSVC is also greater than that of the SVC.** The design of the double-swing vanes improves the load fluctuations on the eccentric and shaft bearings and enhances the operating smoothness of the compressor. Overall, the assessment of the structure and dynamics of the DSVC shows that the DSVC has the advantages of high efficiency, light weight and simple component geometries, which make it well suited to the requirements of electric vehicle air conditioning systems.

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