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Performance analysis of SiO₂/PAG nanolubricant in automotive air conditioning system



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ABSTRACT

The performance of an automotive air conditioning system (AAC) needs to be enhanced in order to minimize its environment impact and reduce global fuel consumption. Implementing nanofluid technology using nanolubricants inside compressors can improve its performance. Therefore, this paper presents the development of an AAC system performance test rig. The SiO₂/PAG nanolubricant was prepared in a prior performance experiment and the stability of the colloidal was also attained. The experiment was conducted with initial refrigerant charge ranging from 95 to 125 gram and compressor speeds of 900 to 2100 RPM. The performance of the AAC system was evaluated by determining the heat absorb, compressor work and coefficient of performance (COP). The results found that the maximum increase and the average COP enhancement for SiO₂/PAG nanolubricants are 24% and 10.5%, respectively. It can be concluded that the COP was highest at 0.05% volume concentration for all compressor speeds.

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