4. CONCLUSION

In this work, thermodynamic analysis has been performed to investigate the integration of a pressure exchanger device into the CO_2 transcritical refrigeration system. The numerical models were established on Engineering Equation Solver to evaluate the potential of PX to enhance the energy efficiency of the CO_2 system. Two different layouts were investigated, including PX and ejectors: a single stage, and a two-stage system. Comparison of the systems was made with a system based on parallel compression. The refrigerant flow was constant after the gas cooler in all cases, but two temperatures,33 ℃ and 35 ℃, were analyzed. Results for the single-stage system show that COP could improve by 6% to 7.5% under investigated conditions. In addition, the evaporation capacity was 4.9 % higher than the parallel compression case. The investigation of the two-stage system shows that COP could improve by 14 % to 16.5 % and with an increased evaporation capacity of 4.4%. In further work, experiments will be performed with the proposed layouts to verify the efficiency of PX.

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NOMENCLATURE

LP	Low pressure	*PX*	Pressure exchanger
HP	High pressure	*h*	Enthalpy (KJ/kg)
E_g	Entropy generation (J/kg. K)	*S*	Entropy (J/kg. K)
BR	Boost ratio	*in*	Inlet
out	Outlet	*LT*	Low temperature
MT	Medium temperature		

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