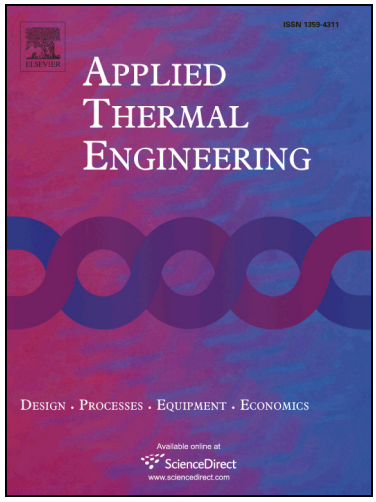

Optimization Study of Distillation Column Based on Type I Absorption Heat Pump

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Abstract: Due to the thermodynamic deficiencies in general pressurized distillation process, a new distillation system based on Type I AHP (absorption heat pump) is proposed in this paper. The proposed system uses AHP to recover the waste heat from column condenser and reheat the feed materials of column; meanwhile, the cooling capacity of column condenser can be increased, which leads to the decrease of the pressure in distillation column. With general distillation system of depropanizing column (C-101) as an example, using numerical simulation software *Aspen Plus*, the effect of inner parameters on the energy consumption has been conducted to approach the general rules of energy saving in distillation. Then the new distillation system is adopted and the optimization of its energy consumption is conducted to determine the optimum operating condition. The numerical simulation results show that the steam consumption can be decreased by 23.3% compared with general C-101 system, reaching the minimum. Moreover, the extra heat output of AHP is treated as the heat source for the reboilers of deethanization column (C-102) and refined propylene column (C-103), which reduces the total steam consumption of three-column processes by 22.1%.

Key words: Distillation column; Absorption heat pump; Waste heat recovery; Optimization of energy consumption system.