

### Simultaneous Optimization Models for Multiple Utility Heat Exchanger Networks

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In heat exchanger network synthesis(HENS) system, single utility networks with conventional superstructure are rather well solved by using mixed integer nonlinear programming(MINLP), but multiple utilities targeting for heat exchanger networks is still inadequate. We used sub-superstructure to consider multiple utilities usage with simultaneous MINLP method. The heart of the strategy is to connect different types of utilities in series, and put them into the sub-superstructure. Applying the new superstructure to the HENS model allowing multiple utilities targeting makes it possible to find feasible optimal solution for the case of various utilities consideration with simultaneous MINLP model. Rather than determine that single structure for the optimum corresponding to the minimum total annual cost (TAC), it is valuable in practice to determine the useful utilities types and consider the limitation of practical works.