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Constructal design and optimization of a dual pressure heat recovery steam generator

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Abstract

Optimum design of the Heat Recovery Steam Generator (HRSG) has noticeable effects on the thermal efficiency of the combined cycle power plants. In this paper, constructal design of a dual pressure HRSG is proposed. It is shown how to simultaneously optimize the operating and geometric design parameters of the HRSG by using the constructal theory. Considering the minimum total entropy generation as objective function, optimum parameters of the HRSG unit are derived by using the genetic algorithm method under the fixed total volume condition. The optimized total volume, aspect ratios of the units, the number of tubes through the length and width, the heat transfer area of the HRSG and thermodynamic properties are significant features of the flow configuration resulted from constructal design. Optimal aspect ratios of the units are correlated to the pressure and temperature and effects of these variables on the main geometric

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