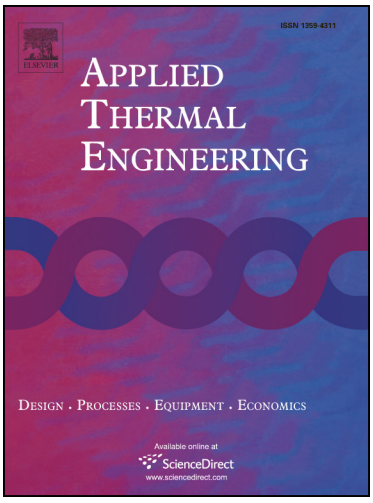

Generic approach for estimating final feed water temperature and extraction pressures in Pulverised Coal Power Plants

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Generic approach for estimating final feed water temperature and extraction pressures in Pulverised Coal Power Plants

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Abstract

An important choice that Coal fired power plant (CFPPs) designer needs to make is the final feed water temperature (FFWT) as well as extraction pressures from the turbines which supplies heating steam to the heaters. Different methods have been reported in literature for determining the extraction pressures. The optimal cycle efficiency method (OCEM) appears to be the most common approach reported. It adopts an equal partitioning of feed water temperature (or enthalpy) rise across all the feed water heaters including the economizer which is situated in the boiler. However, it seems that most power plant designers deviate from this approach for economic and/or operational reasons. Different OEMs have developed thermo-economically optimized methods for determining the FWH extraction pressures. However, these methods are not disclosed in open literature. In this research, the normalized feed water temperature rise across the FWHs and economizers of various CFPPs were examined. A modification of the OCEM approach which better correlates to what is observed in current plants is proposed. The key modification is in incorporating a suitable FFWT. Furthermore, the feed water temperature rise between the condenser exit and the FFWT is equally partitioned across all the feed heaters (excluding the economizers). The method was tested on the case study plants, and a maximum error of 7% was found for the final feed water temperatures while the maximum error of the saturated vapour enthalpies that were calculated using the predicted extraction pressures was 2.2%.

Keywords: Coal fired power plants, Feed water heaters, extraction pressures, final feed water temperature, modelling.