

Dynamic simulation of the drum-type boiler start-up taking into account the stresses in the steam drums shell

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A mathematical model is developed for simulating the start-up behavior of a natural circulating drum-type boiler. The model developed is derived from the first principles of mass, energy and momentum conservations. A stress sub-model is applied to predict the thermal stress distribution. The sub-model based on the discretization of the Fourier's heat conduction equation. Base on the input data of the start-up procedures and the parameters of the boiler, the drum pressure, and the drum water level are simulated. On the basic of the drum pressure simulation result, the inner drum wall temperature is determined, and next, the temperature and thermal stress distribution in the drum shell are predicted. The drum pressure simulation results showed a good agreement with the drum pressure measurement.