

## METHODS OF THE ZONAL MODEL APPLICATION IN NUMERICAL SIMULATIONS

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### Abstract

*The radiative models used in the numerical simulations of the pulverized coal-fired furnaces can be divided into flux and zonal models. For the zonal models, furnace volume and walls are divided into volume and surface zones. For the calculations of the heat exchange, the direct and total exchange areas for each pair of the zones are needed. The problem with the application of the zonal model is inability to change the radiative properties during the iterative process of calculation. This paper describes the recent attempts to allow for the variation of the wall emissivities. Three models are described: temporary correction of the total exchange areas (TCTEA), repeated run of the numerical simulation (RRNS), and current correction of the total exchange areas (CCTEA). In the TCTEA model, the new values of the surface emissivities are found on the basis of the wall temperatures at the end of the numerical simulation and new set of the total exchange areas is determined. Three or four numerical simulations are needed to reach the convergent solution. All other variables start from the values determined by the previous simulation. The RRNS model is similar to the TCTEA model, with the exception that thermo-fluid variables start from the initial values. In the CCTEA model, the total exchange areas are modified as the calculation proceeds, according to the current values of the surface emissivities and summation principle. Only one numerical simulation is needed to reach the convergent solution.*

**Keywords:** *Pulverized coal, furnace, zonal model, numerical simulation, radiative transfer, surface emissivities.*