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Numerical Simulation of Thermal Process in an Industrial Rotary Furnace ZEYI JIANG, XIAOBING YANG, XINXIN ZHANG, University of Science and Technology Beijing — A numerical simulation was performed for the complex thermal processes of heating steel bars in a rotary furnace, which involve both the momentum transfer and the energy transfer mainly by radiation and combustion. A CFD commercial software CFX was employed to solve the proposed 2-D mathematical model. The boundary conditions for the simulation were initially chosen basing on on-line measured data of the products. The temperature and velocity profiles inside the furnace will be obtained as well as the other related thermal parameters. By adjusting the boundary conditions, the proposed model can be used for the dynamical control of the furnace. Meanwhile, using the radiative heat flux from the furnace wall, the surface temperature of steel bar can be obtained from the simulation. The total heat exchange factor of each control zone in the furnace is analyzed along the circumferential and axial directions of the steel bar, as well as among different zones of the furnace. These total heat exchange factors will be further used to improve the model for simplifying the online control.

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