CONDITIONING MONITORING AND FURNACE OPERATION AND DESIGN

(658) - IMPROVEMENT OF IMPLICITLY SOLVED, MULTIPLE 1D SIMULATIONS OF INDUSTRIAL FURNACES IN REGARD OF PROPERTY DETERMINATION AND USABILITY

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The appliance of implicitly solved, multiple 1D simulations offers the possibility of yielding transient simulation results, describing hours of production time within minutes of computation time. This time efficient procedure is possible because of reducing the real-life complexity of a problem towards its absolute minimum. Hence, it is only possible to describe a crude process behavior and not a fine detailed description as known from computational fluid dynamic (CFD) simulations. Besides a physically accurate description of energy transfer by utilizing the major modes of heat transfer, also the parameters to describe the various phenomena of heat transfer are important. For example, the precise description of the heat transfer coefficient is vital for an exact modeling of the convective heat transfer. The heat transfer coefficient depends on several different factors like the geometry of the body flowed around, the thermal conductivity of the circulating medium in the boundary layer and the flow regime of the fluid. Therefore, analytical relations were developed for well- defined problems that can accurately describe the heat transfer coefficient for these problems. Since the interior furnace structure is more complex than these well-defined problems, analytical solutions cannot be applied properly. As a result, it was necessary to develop a procedure which can automatically determine an average heat transfer coefficient for the specified furnace interior. The purpose of this paper is to depict possible improvements, like estimating the heat transfer coefficient, regarding the implementation of implicitly solved, multiple 1D simulations. It will give a practical insight in automizing computation processes and improving usability for the end user by providing graphical user interfaces for simulation setup.

Palavras-chave : Digital Shadow