1. THREE DIMENSIONAL AERODYNAMICSAND COMBUSTION PREDICTIONS FOR AL-HARTHA BOILER FURANCE

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Abstract

A three dimensional aerodynamics and combustion predictions for Al-Hartha boiler furnace are studied numerically by using finite volume method with crude oil and gaseous fuel. On premixed combustion model and probability density function (PDF) table are used to analyze the process and species transport model is applied for prediction aerodynamics of pure methane and air mixture combustion. After the iterations in engineering drawing, the compact shape of domain is imported from design modular to ANSYS 15 package programmer for starting the state of entering the boundary conditions of all thermal variables (temperature,velocity, pressure, turbulent intensity, hydraulic diameters …..etc.).
To execute the programme. Initially, by using the discrete phase model, liquid fuel combustion   (crude oil) was analyzed to get acceptable results oftemperature distribution, velocity, etc. The maximum temperature is 2460K for crude oil and 2140K for gas fuel (at the furnace center between the upperand lower burners in wind box reign in front of burners practically in instructionof power plant industrial company, it is found 2375K for crude oil and 2230 Kfor gas fuel. The turbulent kinetic energy (k) with dissipation rate (ε) model isused to solve this turbulent flow process. The boundary conditions and operationorders of boiler are taken from the power station as data to discover the case study and to get good reliable finding.
The results of this study are presented on graphs with suitable discussions of parameters such as temperature, velocity, turbulent intensity, and mass and mole, concentration of species,density, combustion products, NOpollutants portions, and main properties elevation for combustion conditions. The maximum magnitude velocity is 21m/s for gas fuel(methane) and 71.5m/s for crude oil, at elevation (y =11.782 m) in front of burners in level three, the tangential flow velocity being the dominating velocity and has large value than radial and axial velocities, with value 23m/s.