

On the Electric Field Simulation in the Electrostatic Precipitators

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Abstract— This paper analyses the distribution of the electric field in an electrostatic precipitator through simulation techniques. For this reason the finite volume method is used. The computational program, created in MATLAB, considers the nonuniform distribution of the electrical charge density. The technique used to estimate the charge density in every point of the computational domain is similar to that used for the determination of electrostatic potential. This analogy was possible based on the observations made by analyzing the computational and experimental results obtained by other scientists and published in their previous works. So our computational model calculates both charge density and electrical field distributions using almost the same numerical techniques. The results are presented in a comparative manner. Both constant and variable charge density distributions were considered in the electrical potential and the electric field strength calculations. Also they were compared with results obtained by using a commercial program, QuickField Professional, that uses finite element method to calculate the electric field, but only for a constant value of the electrical charge density. Finally the error calculation was done. Its maximum value proved to be less than 1 %; this remark permits to formulate some conclusions. The results obtained by using our program are in good agreement with those obtained and published by other researchers.