Inverse Heat Transfer Analysis of a Melting Furnace Using Levenberg-Marquardt Method

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Abstract : This study presents a simple inverse heat transfer procedure for predicting the wall erosion and the time-varying thickness of the protective bank that covers the inside surface of the refractory brick wall of a melting furnace. The direct problem is solved by using the Finite-Volume model. The melting/solidification process is modeled using the enthalpy method. The inverse procedure rests on the Levenberg-Marquardt method combined with the Broyden method. The effect of the location of the temperature sensors and of the measurement noise on the inverse predictions is investigated. Recommendations are made concerning the location of the temperature sensor.