ملخص البحث باللغة الإنجليزية:

The aim of this paper is to establish a reliable model that provides the best fit to the specific behavior of the flow stresses of the 10%Cr steel alloy at the time of hot deformation. Modified Johnson–Cook and strain-compensated Arrhenius-type (phenomenological models), in addition to two Artificial Neural Network (ANN) models were established with the view toward investigating their stress prediction performances. The ANN models were trained using Scaled Conjugate Gradient (SCG) and Levenberg–Marquardt (LM) algorithms. The prediction accuracy of the established models was evaluated using the following well-known statistical parameters: (a) correlation coefficient (R), (b) Average Absolute Relative Error (AARE), (c) Root Mean Squared Error (RMSE), and Relative Error (RE). The results showed that both of the modified Johnson–Cook and strain-compensated Arrhenius models could not competently predict the flow behavior. On the contrary, the results indicated that the two proposed ANN models precisely predicted the flow stress values and that the LM-trained ANN provided a superior performance over the SCG-trained model, as it yielded an RMSE of as low as 0.441 MPa.