

Abstract

Building an appropriate mathematical model that describes the system behaviour with a certain degree of satisfaction is quite challenging owing to the uncertain and volatile nature of thermodynamic constants and geometric parameters. In this paper, we present a technique to approximate and validate the dynamic behaviour of the Aström-Bell boiler-turbine power plant based on an RBFNN over a large operating range. The proposed RBFNN is applied to solve the parametric identification problem for nonlinear and complex systems using an optimiser based on a hybrid genetic algorithm. This optimiser is composed of the gradient descent optimiser and a genetic algorithm for fast convergence. Two simulations were performed to show the effectiveness of the proposed technique under different situations with several boiler-turbine input variables. The optimal structure and parameters of the obtained RBFNN-based model emulates well the dynamic behaviour of the Aström-Bell boiler-turbine system