Artificial Neural Networks for Thermochemical Conversion of Biomass - DTU Orbit (09/11/2017)

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Artificial neural networks (ANNs), extensively used in different fields, have been applied for modeling biomass gasification processes in fluidized bed reactors. Two ANN models are presented, one for circulating fluidized bed gasifiers and another for bubbling fluidized bed gasifiers. Both models determine the producer gas composition and gas yield, using the biomass composition and only a few operating parameters in the input layer. Each model is composed of five ANNs with two neurons in the hidden layer. The backpropagation algorithm is used to train them with published experimental data from other authors. The obtained results show that the percentage composition of the main four gas species in producer gas (CO, CO2, H2, CH4) and producer gas yield for a biomass fluidized bed gasifier, can be successfully predicted by applying neural networks. The results obtained show high agreement with the published experimental data used (R2 > 0.98) and are better than those achieved using a modified thermodynamic equilibrium model. Furthermore, a sensitivity analysis has been applied in each ANN model showing that all selected input variables are important.

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