Multimodel Approach using Neural Networks for Complex Systems Modeling and Identification

S. Talmoudi [1*], K. Abderrahim [2], R. Ben Abdennour [2] and M. Ksouri [3]

[1] *Superior Institute of Applicated Sciences and Technology of Mateur, 7000 Mateur, Tunisia*
[2] *National School of Engineers of Gabes- Street of Medenine, 6029 Gabes, Tunisia*
[3] *National School of Engineers of Tunis, BP 37, the Belvedere, 1002, Tunis, Tunisia*

Abstract: This article presents a new approach of systematic determination of models base for the multimodel approach. The application of this approach requires, first, to classify a numeric data by exploiting the self-adapting artificial Kohonen neural-networks. The obtained data relative to the clusters are then exploited for both structural and parametric estimation of base models. To resolve the estimation problem of the validity of the elementary models, used we proposed a new technique, based on the minimization of a quadratic criterion. This criterion exploits the centers of clusters obtained in the determination of the models base step. A comparative study with the residues approach showed the contribution in precision of the proposed validities computation technique. The satisfactory results obtained in numerical simulation, incited us to validate experimentally the contributions already mentioned. Indeed, an on-line experimental validation of the new proposed multimodel representation was carried out on an olive oil esterification reactor. The obtained results are very satisfactory in terms of precision and robustness.

---

* Corresponding author: samia.talmoudi@enig.rnu.tn