

Recently, a novel class of nonlinear adaptive filters, called spline adaptive filters (SAFs), has been introduced and demonstrated to be very effective in many practical applications. The learning rules of these architectures are based on the least mean square (LMS) algorithm. In order to provide theoretical foundation to the SAF, in this paper we provide a steady-state performance evaluation. In particular, after the stochastic analysis of the mean behavior of the SAF approach under the Gaussian assumption, the analytical derivation of the theoretical excess mean square error (EMSE) and the normalized misadjustment are derived and discussed. The proposed analysis of EMSE and misadjustment is based on the energy conservation approach that has been extended to SAF architecture. The derived theoretical analysis allows to accurately predict the steady-state performance. Therefore, some properties for the correct choice of filter parameters are also provided. Experimental results demonstrate the effectiveness of the analysis results.