IDENTIFICATION OF PARAFAC–VOLterra CUBIC MODELS USING AN ALTERNATING RECURSIVE LEAST SQUARES ALGORITHM (FriAmOR1)

**Author(s):**
Anis Khouaja  
Gerard Favier  
(Laboratoire I3S (UNSA–CNRS), France)

**Abstract:**
A broad class of nonlinear systems can be modelled by the Volterra series representation. However, its practical use in nonlinear system identification is sometimes limited due to the large number of parameters associated with the Volterra filters structure. This paper is concerned with the problem of identification of third-order Volterra kernels. A tensorial decomposition called PARAFAC is used to represent such a kernel. A new algorithm called the Alternating Recursive Least Squares (ARLS) algorithm is applied to identify this decomposition for estimating the Volterra kernels of cubic systems. This method significantly reduces the computational complexity of Volterra kernel estimation. Simulation results show the ability of the proposed method to achieve a good identification and an important complexity reduction, i.e. representation of Volterra cubic kernels with few parameters.