AUTHOR OF CORRESPONDENCE
Alois Schloegl
445/4 Institute of Biomedical Engineering,
Graz University of Technology
Brockmanngasse 41,
A-8010 Graz, Austria
Phone: +43 316 873-5320
Fax: +43 316 812964
E-mail: a.schloegl@ieee.org

TITLE:

CONSIDERATIONS ON ADAPTIVE AUTOREGRESSIVE MODELLING IN EEG ANALYSIS

ABSTRACT:
With an adaptive autoregressive (AAR) model the time-varying charactistic of signal can be described as e.g. event-related variations in the electroencephalogram (EEG). Conventional autoregressive (AR) modelling requires stationary signals and a model order, which is determined a priori. In case of AAR models, at least a "nearly stationary" behaviour is of importance. The properties of such a "condition of nearly stationary" are described in more detail. Especially, the rate of adaptation and the principle of uncertainty are considered. For the estimation of AAR parameters two methods are discussed: the Recursive-Least-Squares (RLS) and the Least-Mean-Squares (LMS) methods. Techniques for determining the model order and the update coefficients are suggested.
Two kinds of activity can be distinguished: firstly, the slow variations of the EEG patterns as e.g. event-related desynchronisation (ERD) during mental activity or the variations in the EEG during different sleep states. Secondly, short-lasting events; these are transient patterns and are highly non-stationary. In EEG analysis these highly non-stationary events can be artefacts from muscle activity or short-term events like spindles or K-complexes in the sleep EEG. It is shown, how highly non-stationary events can be extracted. Results on application of AAR modelling in event-related EEG and sleep data are reported.

TECHNICAL SUBJECT CATEGORY
+ Adaptive Signal Processing