Problems of identification of the stochastic mathematical model

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A mathematical model is a description of a system using mathematical concepts and language. Mathematical models can have a variety of forms, reflect the different properties of objects, characterized by varying degrees of formalization and detailing, and their purpose is to build a general presentation of the processes on the basis of individual observations of a real object of process constantly interacts with the environment and this interaction is bidirectional.

The approximate system identification problem based on misfit approach, has a sub problem the computation of the closed trajectory in the behavior of a given model to a given time series. This is a smoothing problem whose solution is available in closed form. However efficient recursive algorithms and the filtering problem in which the approximation is performed in real time is another subject of interest.

More detail attention of the impact of the environment to the subject is needed. The approximate identification problem is the global total least squares problem, i.e. misfit minimization problem for a class of a model. The approximate filter is based on the classical Kalman filter derived for a related stochastic system. There are two groups of acts to the state variables (phase coordinates) of the object, according to the nature of the environment influence.

The first group includes the effects which modify the state variables additively. This means that signals which are proportional to these effects are added to the signals proportional to the corresponding state variables. Input effects may be useful (control signal) and interference (disturbance).

The second group of environmental influences are effects state of object variables indirectly, usually not additive. Since simultaneous structural and parametric optimization can lead to the emergence of many local extremums, it is necessary to carry out the basic parametric optimization before the structure optimization. There is identity search algorithm. It measures input and the output signals of the object and carries out an active search, accompanied by tests on an adaptive model by parametric channels. This expands the boundaries performance identification systems with adaptive model.

The basis of the search engines can use a simple method extremum search, starting from the simple search options and finishing gradient methods, and combinations thereof. Structure optimization must be final stage of the parametric optimization (adaptation).