FINITE-FREQUENCY IDENTIFICATION: THE SOFTWARE IMPLEMENTATION IN THE GAMMA SYSTEM

Ljubov MIKHAILOVA*, Albert ALEXANDROV**
**Moscow State Institute of Steel and Alloys (Technological University) Elektrostal Brunch, Pervomayskaya 7, Elektrostal,144000, Russia, lsmixx@rambler.ru*
*** Institute of Control Sciences, Profsoyuznaya, 65, Moscow, 117997, Russia,*
alex7@ipu.rssi.ru

Abstract: At present, the control theory has at its disposal a number of identification methods for plants specified by linear differential equations. The identification process can have passive or active forms. In the *passive* identification, the measured input to the plant has the meaning of a control action which depends on the control objectives and is not related to identification of the plant. With such an input, identification might not be possible; hence, *active* identification is often practiced where, in addition to control, the measured input contains an extra component, a so-called test signal aimed at identifying the plant. The finite-frequency identification method was designed for the needs of active identification. The test signal is represented by the sum of harmonics with automatically tuned (self-tuned) amplitudes and frequencies where the number of harmonics does not exceed the state space dimension of the plant. The self-tuning of amplitudes is carried out to satisfy those requirements on the bounds on the input and output which hold true in the absence of a test signal.

In this paper the software implementation of this method in the system GAMMA is considered. MATLAB and GAMMA are oriented on different groups of users. MATALB is intended for the researchers who well know the control theory. The researcher easily creates the program for the solution of real problems of its data domain using a rich spectrum of m-functions. GAMMA is intended for the engineers-developers of a control system. The purposes of this group and a small time for control system design eliminate a capability of their participation in creation of the software for the solution of their problem.

GAMMA is a two-level CACSD tool for identification and controllers algorithms synthesis of linear plants by engineers-developers of control system. The first level (the engineers environment) represents set of design procedures (the directives) that provide the automatic solution of design problems. The second level (the researchers environment) intends for development and modernization the software of first level by a researcher. The directives of GAMMA is developed with use of program modules. Each module solves the elementary problem of control theory. The language INSTRUMENT is used for directives implementation in the GAMMA system. The interpreter of this languages is the part of GAMMA. All standard operations are realized in the INSTRUMENT: loops, conditional, subroutines, operations with arrays and etc. Most of calculation modules are wrote in the INSTRUMENT. Besides the possibility for using modules written in the another languages (C or PASCAL or the other) is maintained.

The software for finite-frequency identification is implemented as the number of directives. One of them is D123su – the directive of finite-frequency identification where the amplitudes and the frequencies of the test signal and the filtering time are specified numbers. The structure of directive and example of application are also given.