Chapter 10
Professors of Innovative Implementations in Sliding Mode Digital Technology for Enhancing Student Competence

Vardan Mkrttchian
HHH University, Australia

Irina Potapova
Astrakhan State Architecture and Construction University, Russia

ABSTRACT

The aim of our research is the development of portrait office administrator of the educational process on the basis of competence approach for Students and Professors of Innovative Implementations in Sliding Mode Digital Technology. By competence we mean the unity of knowledge, skills, and professional experience of the behavior of employees, allowing them to successfully perform the job tasks. The competence is of the activity, the specifics of the situation. Describing the competence, we fix the requirements for professionalism of the person at a particular workplace. To create a competency model, you can buy competencies guide, select it from the appropriate competencies and evaluation criteria, and then adapt them to your organization's needs. A composed portrait position is useful for the selection of candidates and employees of conformity assessment specific position requirements.

INTRODUCTION

The Sliding Mode Control finds quite a wide application in all spheres of technics and technology, in some scientific research, in the humanities, education and some other non-technical areas. First of all, it is related to relay systems which, due to their simplicity, are used as numerous regulators with dual-mode control ("off/on"). Development of the theory of relay systems in the 1940-s – 1950-s is manly connected with the appearance of the relay-type control actuator (I. Flugge-Lotz, 1953) and vibration voltage control instruments. Later years saw the publication of a number of works on relay systems theory,

DOI: 10.4018/978-1-5225-3485-3.ch010

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offering various approaches to analyzing periodic motion and its sustainability: frequency methods (Y. Tsypkin, 1969, J. Hamel et. al., 1993), matrix method (P. Bromberg), method using z-transformation (E. Jury), method of analysis in statespace (Mansour et al., 1984), method of finite-difference operators (G. Pospelov, 1986). There were also worked out methods of relay systems synthesis – synthesis in statespace. Moreover, analysis and projecting of relay systems widely use approximate method of harmonic linearization (E. Popov). In the 1960-s – 1970-s the concept of discontinuous control came to be associated not only with relay systems, but with the newly-emerged systems with variable structures, and also with sliding modes whose existence is possible in relay systems as well as in systems with variable structures (B. Petrov, S. Emelyanov, V. Utkin (Petrov et al., 1966)).

Despite the simplicity of action principle (especially of relay systems), dynamics of discontinuous control systems is much more complicated than that of linear systems. The systems with discontinuous control allow of such effects as self-oscillations, several equilibrium positions, sliding modes and chaos. Therefore, there exist a few various theories reflecting different theoretical or practical aspects of analysis and synthesis of such systems. Meanwhile, it should be noted that research and publications give less attention is given to the problem of analysis and synthesis of such systems considering their reactions to outer control and disturbing input than to the problem of autonomous movement analysis. This is especially true for the theory of sliding mode systems. The overwhelming majority of publications on this theme (with some exceptions based on the approaches different from the present work) cover only the so-called ideal sliding modes realized as control switching with the infinitely high frequency and off-line operations. With the use of methods oriented to ideal sliding modes (if the surface of the switching is formed considering all components of state vector), the analysis of the system as a tracking one proves impossible as the tracking in the above system has ideal accuracy. At the same time, it is common knowledge that in practice the accuracy of the systems is not ideal. Thus, construction of the model considering the reasons for this inaccuracy and the corresponding methods of synthesis and analysis is very important for the practice of designing such systems.

Appearance of the theory of the so-called sliding modes of high and, particularly, second-order (A. Levant, I. Castellanos, L. Fridman, I. Boiko (Boiko et al., 2006; Boiko & Fridman, 2006), the theory which has been progressing in the last decade, poses new research problems in terms of developing frequency methods of synthesis and analysis as well as in applications of this theory. Offered as means of eliminating high-frequency vibrations proper to regular sliding modes, the developed algorithms of high-order (particularly, second-order) sliding modes realization posed new questions: if they really help to eliminate high-frequency vibrations and if they offer advantages over regular sliding modes in terms of mean motion dynamics.

Rather scattered and unstable situation is characteristic of Sliding Mode in non-engineering spheres. Though, since 2011 research and technical community has been demonstrating interest for Sliding Mode application in these spheres, particularly, in education, in research and in some other area of the humanities (V. Mkrttchian, 2013).

The goal of the chapter is new research Innovative Implementations in Sliding Mode Digital Technology for e- Government, e-Learning, e-Health of Sliding Mode in non- engineering systems, development of methods, technologies, software solutions, technical means and tools for increasing efficiency of intellectual control and communications with estimation of new emerging opportunities and results.

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