New Expert Technologies of the Possibilistic Prediction in Fuzzy Dynamic Systems

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The plenary speech proposes a new direction in the fundamental study of weakly structured dynamic systems (WSDS) and in the research of systems science in general. Different from other approaches to the investigation of dynamic systems where the source of fuzzy (possibilistic) uncertainty is an expert, the plenary speech presents the approach where the source of uncertainty is also *the time*. That is, the fuzzy time factor also contributed to the uncertainty in dynamic systems, which makes the range of problems to be investigated much wider. The dual (extremality) approach to the study of weakly structured dynamic systems with respect to fuzzy time is novel and presently has no analogue. The extremality of fuzzy processes makes it possible to describe the *fuzzy dynamic system and its prediction* in terms of "*extended current and compressed future*" fuzzy time intervals and thereby to obtain more authentic subjective information on the expert, his/her knowledge, on the states of the investigated WSDS and so on. So we construct *new type structures in the problems of expert knowledge stream's formalization, synthesis and analysis*. New results are obtained in the theory of extended monotone measures. The new Fuzzy-integral models of WSDSs are constructed with controls taken into account. Methods of *identification, filtering, prediction and optimal problems* for fuzzy-integral models of extremal fuzzy processes are developed. The trustworthy realizations of possibilistic scenarios are also constructed for future fuzzy time intervals. These give new possibilities to the researchers of complex dynamic processes. The software library, on the other hand, is a novel instrument for engineering of intelligent decision support systems and expert systems.

All results are presented in my Monography:

Gia Sirbiladze, *Extremal Fuzzy Dynamic Systems - Theory and Applications*, IFSR International Series on Systems Science and Engineering, 28, Springer, 2012, 375 pp.