Dynamics of Continuous, Discrete and Impulsive Systems
Series **A:** *Mathematical Analysis* **16 (2009)** 115-128
 http://www.watam.org

UNIFIED OBJECT DEFINITION FOR EMERGING SEMANTICS IN DISTRIBUTED PARAMETER SYSTEMS

A. D. Bogobowicz[1]

[1]Faculty of Mathematics and Natural Sciences
University of Kardynal Stefan Wyszynski
A.Bogobowicz@uksw.edu.pl

Abstract. The paper presents some problems of distributed parameter systems considered from the point of view of object oriented methods. A canonical object is formulated for approximation of the phase space of non-linear distributed parameter systems. Dynamic canonical objects are specified to enable process recognition in the open domain of the system. In the paper we are primarily interested in controlled processes and the introduced example invariant measures chosen for dynamic objects allow us to identify local properties and possibly choose a unique local value. As an example the process described by non-linear hyperbolic system is considered. The local behaviour is approximated by parabolic system.

Keywords. process recognition, non-linear hyperbolic systems, measure theory, entropy production.

1 Introduction

The paper is an extension of earlier contents that were published in ([8, 20]). The terminology crossing boundaries of disciplines is chosen deliberately, as the author's background in optimal control theory and applied mathematics as well as earlier theoretical research do not allow to understand and solve many new problems that arise in the complex systems when new states become accessible. In such systems, as the parameters change, boundaries assumed for the model may become invalid, differentiation in values and dimensions can grow. However, the model has to retain its semantic value. The reasoning of this paper is based on the assumption that the global properties and parameters of the model are not known. To give an example, in controlled systems it is not possible to satisfy the uniqueness theorem for some arising scale of local phenomena description. It is therefore important to observe that de-differentiating properties at the new boundaries must be learned. Very frequently it turns out to be very confusing to draw conclusions from lower order (and lower dimension) models that are used to represent local higher order structures ([14], [16]).

In the paper de-differentiation is proposed to be performed by new entities - dynamic (in particular, migrating) canonical objects. The motivation