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COULD BE ACTIVE IN NATURE SCIENCES – THE COMPLEXITY THEORY

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Rezumat. *Pornind de la caracteristicile de bază ale sistemelor complexe, lucrarea de faţă studiază posibilităţile de utilizare a acestor noţiuni pentru elucidarea unor probleme încă nerezolvate privind: a) procesele de creştere/acomodare din: (i) biofizică, (ii) cosmologie etc., b) teoria simulărilor numerice ale unor procese fizice diferite. Au fost definite şi evaluate razele de stabilitate şi – respectiv – convergenţă ale unor diferite scheme numerice, ceea ce a permis estimarea adâncimii logice accesibile a unor simulări numerice de diferite tipuri, considerate ele înşişi drept sisteme complexe.*

Abstract. *Starting from the basic features of the complex systems, this work studies the possibilities to use these basic notions in order to elucidate some still unsolved problems referring to the: a) growth/accommodation processes from: (i) biophysics, (ii) cosmology, etc., b) theory of numerical simulations of different physical processes. There were defined and evaluated the stability and convergence radii of different numerical schemes, which allowed to estimate the accessible logical depth of various numerical simulations, considered themselves as complex systems.*

Keywords: Complexity theory, Growth/accommodation processes, Inflation stage, Stability and Convergence Radii, Accessible Logical Depth

1. Introduction

Despite of the fact that the theory of Complexity was elaborated and supported by many illustrious scientists, as Ettore Majorana [1], the mathematicians Warren Weaver [2] and Claude Shannon [3], the Physics Nobel prize laureates Murray Gell-Mann [4], Philip Warren Anderson [5], Kenneth Geddes Wilson [6], Pierre-Gilles de Gennes [7], as well as by the Chemistry Nobel prize laureate Ilya Prigogine (1977) [8], some specialists still consider that "the very young science of complexity has promised much but delivered little so far" [9]. The accomplished study [10] pointed out that the basic features of the complex systems are: a) the preferential use of physical numbers (due to the Universality of the complex systems laws) and: b) the similitude theory, as well as of the: c) power laws in the Complexity theory, d) logical depth of each Physics problem,

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