



Torrent of Changes Renews this World Over and Over Again as the Uninterrupted Flow of Time Brings Youth to the Frontier-less Eternity. - Marcus Aurelius, Roman Emperor and Philosopher

An SMC2016 Special Session – Outline

Complexity and Complex Systems in Computational Cybernetics

It is likely by chance, while distinguishing physics from mathematics, longtime ago I wrote about categories of systems and control theory from a point of view emphasizing information as the third fundamental category in the universe right next to energy and matter.

Prof. Stephen Hawking, recently but not by chance, while discussing further cosmic phenomenon of black holes and light as carrier of information (Fig. 1) in “Conservation of information and time forecasting for black holes” (arXive, January 2014), has pointed out his scientific view on the concept of complexity and marked twenty-first century as the one of science of complexity.

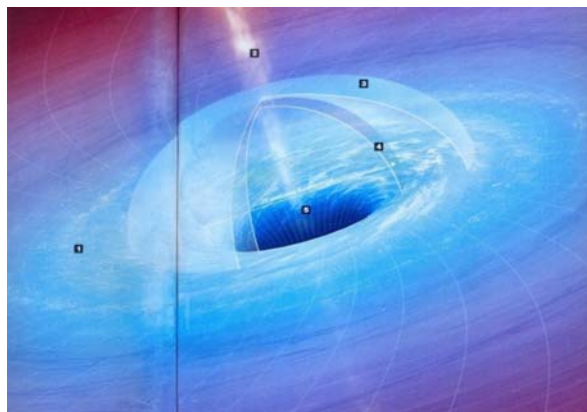


Fig. 1. In the center of Milky Way: Artistic perception by author M. A. Garlick of the phenomenology of black hole SgrA*, weighting 4 million times more than Sun and radiating powerful radio-waves(National Geographic 102(4); 2014, p.29): (1) Superheated energy disc, (2) RO-radiation flow-stream, (3) Static boundary virtual horizon, (4) Horizon of events, (5) Cosmic singularity.

Last summer but not by chance, I got acquainted with a new journal of Chinese Academy of Sciences named “All about Systems and Control” (AASC) with Prof. Ji-Feng Zhang as the editor-in-chief and with his permission (while citing the article and authors) used the figure below in my foreword of a Springer multi-authored I edited (volume 55 in Springer series Studies in Systems, Decision and Control, 2016). Authors Le Yi Wang and Ping Zhao have rightly entitled their article

“Evolution of the feedback mechanism in information era” in AASC 2 (1), 70-76 (2015); it is Fig. 5 on page 74 in it. Bbut in my humble opinion they should have also mentioned computational cybernetics or second-order cybernetics of Prof. Heinz von Foerester .

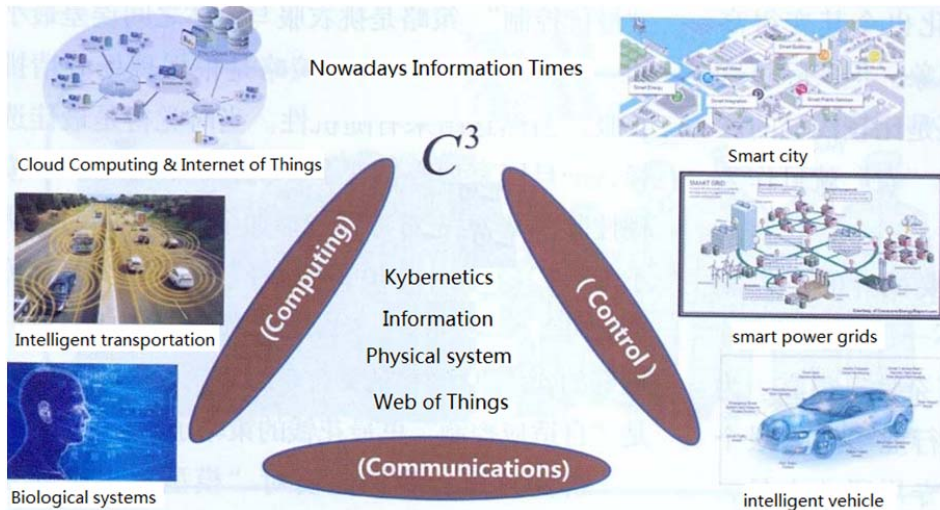


Fig. 2. Foerester’s Second-order Cybernetics or Evolution of the Feedback Mechanisms towards Computational Cybernetics in Information Era.

Lastly but not least, authors Yingsu Wang, Witold Kinsner and Du Zhang have edited the special issue on Cybernetics and Cognitive Informatics of our journal IEEE Transactions on Systems, Man, and Cybernetics Pr. B vol. 39, no. 4, August 2009. Also, they too contributed article “Contemporary cybernetics and its facets of cognitive informatics and computational intelligence” in IEEE Transactions SMC-B 39 (4), 823-833 (2009).

In my humble opinion, if there may be an agreement that there exist not solely terminology differences, then the above written and illustrated outline presentation points out to some celestial existence that might be called “Complexity and Complex Systems in Computational Cybernetics” regardless it does have considerable but countable many facets. It is to those many facets, some discovered and some not as yet, that this SMC2016 Computational Cybernetics special session is devoted, largely inclining towards, on one hand, issues of complex dynamic networks and, on the other, issues of robotics and automated manufacturing systems.

In the sequel further below, there is given the titles and the authors of the tentative papers for this special session gathered in so far; still, a couple of other manuscripts are expected.

*Progress Has Been and Will Be Achieved Always when
Daring To Cross Borders. Surpass Barriers and Exceed Limits.*

Georgi M. Dimirovski
In Skopje and Istanbul, 2015/2016

List of Proposed Contributions –
SMC2016-SS Complexity & Complex Systems in Computational Cybernetics

1/. Fascinating Ideas on Complexity, Complex Networks and Systems: An Overview; by Georgi M. Dimirovski (gdimirovski@dogus.edu.tr; dimir@etf.ukim.edu.mk), Faculty of Electrical Engineering & Information technologies, St. Cyril and St. Methodius University, Skopje, Macedonia.

2/. Overcoming Systems Complexity by Cognitive Cybernetic Reflection; by Ricardo Sanz (: ricardo.sanz.bravo@gmail.com), Universidad Polytechnica de Madrid, Spain

3/. Complexity Computational Cybernetics in Complex Dynamic Systems: Instability-Stability Interplay Mechanism; by Jiqiang Wang, Nanjing University of Aeronautics and Astronautics, Nanjing, China (jiqiang.wang@nuaa.edu.cn), Hong Yue, University of Strathclyde, Glasgow, Scotland UK (hong.yue@starch.ac.uk), Georgi M. Dimirovski, Dogus University, Istanbul, Turkey and St. Cyril and St. Methodius University, Skopje, Macedonia

5/. Decentralized Connective Stabilization of Complex Large-scale Systems with Expanding Construction Using Observers; by Yang Liu (liuyang0595@163.com) and Yuanwei Jing (ywjing@mail.neu.edu.cn, jingyuanwei@ise.neu.edu.cn), Northeastern University, Shenyang, China, Xiaohua Li, Liaoning University of Science and Technology, Shenyang, China, Xiaoping Liu, Lakehead University, Thunder Bay ON P7B 5E1, Canada

6/. Tackling Complexity and Missing Information in Adaptive Control by Fixed Point Transformation Based Approach; by Imre J. Rudas (rudas@nik.uni-obuda.hu), Jozsef K. Tar (tar.jozsef@nik.uni-obuda.hu), Bertalan Csanadi, Obuda University, Budapest, Hungary

7/. Complexity of Constrained Switching for Switched Nonlinear Systems with Average Dwell Time: Novel Characterizations; by Jiqiang Wang, Nanjing University of Aeronautics and Astronautics, Nanjing, China, (jiqiang.wang@nuaa.edu.cn), Georgi M. Dimirovski, Dogus University, Istanbul, Turkey and St. Cyril and St. Methodius University, Skopje, Macedonia

8/. Discrete-time Epidemic Models with Nonlinear Incidence Rates: Complexity Mitigated by Chaotic Control of T-S-Fuzzy Representation, CHANG Chunling (15384609@qq.com), JING Yunwei (ywjing@mail.neu.edu.cn, jingyuanwei@ise.neu.edu.cn), Northeastern University, Shenyang, China,

9/. Hamiltonian Theory Applied to Ameliorate the complexity of TCP Network Congestion Control ; by Wang Kun (570535765@qq.com), JING Yunwei (ywjing@mail.neu.edu.cn, jingyuanwei@ise.neu.edu.cn), JIANG Nan, ZHANG Siying, Northeastern University, Shenyang, China,

10/. Synergy of Switched-fuzzy and Fuzzy-neural Nonlinear Systems Enhances Systems Complexity and Potential; by Vesna Ojleska-Latkoska (vojleska@feit.ukim.edu.mk), Tatjana Kolemishvska-Gugulovska (tanjakg@feit.ukim.edu.mk), Georgi Dimirovski, St. Cyril and St. Methodius University, Skopje, Macedonia

11/. Cooperative Dancing with an Industrial Manipulator Robot: Computational Cybernetics Complexities; by Figen Ozen (figenozen@halic.edu.tr), Hailch University, Istanbul, Turkey and Kubra Tural , Dilek Tukul (dtukul@dogus.edu.tr), Georgi M. Dimirovski, Dogus University, Istanbul, Turkey

12/. Optimal Guaranteed-cost Control of Switched Uncertain Nonlinear Systems: Handling Complexity via Switched Fuzzy Time-delay Representation; by Jinming Luo (luojinming@mail.neu.edu.cn) and Hua Li, Northeastern University, Shenyang, China, Georgi M. Dimirovski, Dogus University, Istanbul, Turkey and St. Cyril and St. Methodius University, Skopje, Macedonia (gdimirovski@dogus.edu.tr)

13/. Flexible Window Control Based on Data for Ameliorated Complexity of AQM in TCP Networks; by YUAN Xudong (yxd4038@sina.com), JING Yuanwei Yunwei (ywjing@mail.neu.edu.cn, jingyuanwei@ise.neu.edu.cn), Northeastern University, Shenyang, China

14/. Semi-Supervised Classification using Higher-Order Co-occurrence Paths to Overcome the Complexity of Data Representation; by Murat Can Ganiz (murat.ganiz@marmara.edu.tr) , Marmara University, Istanbul, Turkey

15/. Optimal Resource Partitioning for Warfare Command Systems and Trafalgar Navel Battle: Complexity Revealed; by Yuanwei Jing (ywjing@mail.neu.edu.cn, jingyuanwei@ise.neu.edu.cn), Xianyong Chen and Chunji Li, Northeastern University, Shenyang, China, Georgi M. Dimirovski, Dogus University, Istanbul, Turkey and St. Cyril and St. Methodius University, Skopje, Macedonia

16/. Weighted Complex Networks: Complexity of Synchronizability Dependence on the Clustering Coefficient; by Yuanwei Jing (ywjing@mail.neu.edu.cn, jingyuanwei@ise.neu.edu.cn) and Dan Wang, Northeastern University, Shenyang, China, Georgi M. Dimirovski , Dogus University, Istanbul, Turkey and St. Cyril and St. Methodius University, Skopje, Macedonia

17/. Overcoming Control Complexity of Constrained Three-link Manipulator Using Sliding-mode Control; by Yunlong Liu (fhyren@163.com) and Zairui Gao, Weifang University, Weifang, China, Yonggui Kao, Harbin Institute of Technology, Weihai, China, Georgi M. Dimirovski, Dogus University, Istanbul, Turkey and St. Cyril and St. Methodius University, Skopje, Macedonia

Provided the proposed contribution be found to possess satisfactory level of innovation and quality, It may well be inferred that these proposed contributed papers could yield this Special Session comprising three parts. Thank you.

