

Invited Speaker 3

Invited speech title: **Natural Computing Paradigm – A Concise Introduction**



Dr. Takashi Yokomori is a Professor of Mathematics Department, Faculty of Education and Integrated Arts and Sciences, Waseda University, Tokyo.

Research themes: Automata and Formal Language Theory, Computational Learning Theory (e.g., Grammatical Inference), Theory of Natural Computing (e.g., Molecular Computing Theory, Bio-informatics, Chemical Reaction Computing)

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Educational and Professional Careers:

1998 -- (present) : Professor, Waseda University, Japan
1997 -- 98: Professor, University of Electro-Communications, Japan
1989 -- 97: Associate Professor, University of Electro-Communications, Japan
1983 -- 89: Researcher, IAS-SIS, Fujitsu Limited, Japan
1982 -- 83: Postdoctoral Fellow at Pennsylvania University, USA
1981 -- 82: Postdoctoral Fellow at McMaster University, Canada
1979 -- 81: Research Associate, Sanno College, Japan
1979 : D.Sci., University of Tokyo, Japan
1976 : M.Sci., University of Tokyo, Japan
1974 : B.Sci., University of Tokyo, Japan

Academic Activities:

Please refer to: <http://www.edu.waseda.ac.jp/~yokomori/activitye.html>

Selected Publications: (since 2010)

- F. Okubo and T. Yokomori : The computational power of capability of chemical reaction automata, *Natural computing*, Vol.15, pp.215-224, 2016.
- F. Okubo and T. Yokomori : Finite Automata with Multiset Memory: A New Characterization of Chomsky Hierarchy, *Fundamenta Informaticae*, Vol.138, pp.31-44, 2015.
- F. Okubo and T. Yokomori: Recent developments on reaction automata theory: A survey, in "Recent Advances in Natural Computing" (Selected results from the IWNC 7 Symposium), Series: Mathematics for Industry, vol.9 (Y. Suzuki and M. Hagiya, eds.), pp.1-22, Springer, 2014.
- G. Rozenberg et al.(Eds.): Handbook of Natural Computing, Chapter 34:"Molecular Computing Machines--Computing Models and Wet Implementations (by M. Hagiya, S. Kobayashi, K. Komiya, F. Tanaka, T. Yokomori), Springer, 2012.
- F. Okubo, S. Kobayashi and T. Yokomori : On the properties of language classes defined by bounded reaction automata, *Theoretical Computer Science*, Vol.454, pp.206-221, 2012.
- F. Okubo, S. Kobayashi and T. Yokomori : Reaction Automata, *Theoretical Computer*

Science, Vol.429, pp.247-257, 2012.

- F. Okubo and T. Yokomori : On the Hairpin Incompletion, *Fundamenta Informaticae*, Vol.110, pp.255-269, 2011.

- M. Ionescu, G. Paun, M. Perez-Jimenez and T. Yokomori : Spiking Neural dP-systems, *Fundamenta Informaticae*, Vol.111, pp.423-436, 2011.

- F. Okubo and T. Yokomori : Morphic Characterizations of Language Families in Terms of Insertion Systems and Star Languages, *Intern. J. of Foundations of Computer Science*, Vol.22, No.1, pp.247-260, 2011.

- F. Manea, V. Mitran and T. Yokomori : Some Remarks on the Hairpin Completion, *Intern. J. of Foundations of Computer Science*, Vol.21, No.5, pp.859-872, 2010.

- O. Ibarra, M. Perez-Jimenez and T. Yokomori : On Spiking Neural P-systems, *Natural Computing*, Vol.9, pp.475-491, 2010.

(For full details, please refer to:

<http://www.edu.waseda.ac.jp/~yokomori/publiste.html>)

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Abstract: Natural computing (NC) is an emerging research area that investigates computing techniques and models inspired by nature, and it also investigates phenomena taking place in nature in terms of computational methodologies. Thus, NC research congenitally bridges between computer science and a broad spectrum of fundamental research fields including biology, chemistry, physics, medical science, and so forth.

In this talk, we give a concise introduction to this new paradigm of NC. Specifically, we give an overview of selected topics of the fields in which the stress is primarily put on theoretical achievements in computing paradigms such as molecular computing and chemical computing.