



'Analysis and Control of Biological Networks'

A Special Issue of Asian Journal of Control

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In systems biology, one of the ultra goals is to engineer unnatural organic molecules that function in living systems to investigate natural biological phenomena and for a variety of applications. In control engineering, the overall aim is to synthesize controllers which can achieve desired performance. The notion of feedback, which is the core of control engineering, is now a central recurring theme in the design of biological regulatory networks. In fact, feedback is so prevalent in biological systems that it can be found at all levels of organization, from the molecular and cellular levels, to the organism and ecological levels. It is impossible to overstate the importance of feedback as a strategy for the maintenance and evolution of life. Therefore, it is reasonable to expect that ideas from control theory will lead to new understanding of the underlying biological processes, and therefore have potential applications in system biology and synthetic biology.

The complexity of biological networks (BNs) poses many challenges for scientists and engineers. In particular, the biological systems have apparently become dependent on the complex infrastructure of the networks to such an extent that it is difficult to analyse and control these networks thoroughly with our current capabilities. Therefore, there is an urgent need to research into modelling, analysis, synchronization and control of BNs using the available systems and control theory. Although many fundamental questions have been addressed with the hope to understand network structures and dynamic properties, some major problems have not been fully investigated, such as the behaviours of switching, oscillating, stability, synchronization and chaos control for BNs, as well as their applications in systems biology and bioinformatics.

This special issue aims to bring together the latest advances in analysis and control of biological networks, which comprise gene regulatory networks, signal transduction networks, metabolite networks and intra-species or interspecies communication networks in microbial communities. Topics of this special include, but are not limited to the following aspects: (1) systems and control analysis of BNs; (2) Modelling of BNs; (3) dynamics analysis of regulatory motifs; (4) robustness and fragility analysis of BNs; (5) synchronization of BNs; (6) design of synthetic BNs, and (7) methods and algorithms for BN analysis.



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Feb. 28, 2011	Completion of Final Review
Sep. 30, 2011	Publication (Tentatively Vol.13, No.5)

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