
Editorial

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Biographical notes: Nitaigour P. Mahalik was awarded ME and PhD in the year 1993 and 1998, respectively. He completed his Postdoctoral during 2002. He was an Invited Faculty in Moscow State Technological University and Gwangju Institute of Science and Technology (South Korea). With more than 90 publications, he has been serving as the Editor, Guest Editor, Committee Members in several journals and conferences. He was the recipient of National Overseas Scholarship and Brain-Korea fellowships. He works in the interdisciplinary areas of automation and control. Presently, he is serving as a Faculty Member in the College of Agricultural Sciences and Technology, Fresno, USA. He is the Member of many professional societies.

Mo Jamshidi (F-IEEE, F-ASME, F-AAAS, F-NYAS, F-TWAS) received a PhD in Electrical Engineering from the University of Illinois at Urbana-Champaign in 1971. He holds three honorary doctorate degrees and is Lutcher Brown Endowed Chaired Professor at the University of Texas System at San Antonio Campus, Texas, USA, and has been the Founding Director of Center for Autonomous Control Engineering (ACE) at the University of New Mexico (UNM). He is the Director of the National Consortium on System of Systems Engineering. He has over 550 technical publications including 58 books and edited volumes. He is the Founding Editor/Co-editor of five journals and one magazine.

This issue celebrates third year of successful publication of IJAAC. The acceptance rate of this journal has been about 30%. The editorial board members have been taking this rate as a positive sign but at the same time they also feel for the authors of the papers whose papers are rejected. It is simply because we do not have space to accommodate more papers in a given volume even if the quality of the papers is reasonably good. We received many suggestions to increase the numbers of issues per year. Recently, it was, in fact, planned to move forward with six issues in 2010 and onwards, unfortunately, it was convinced that more than 90% of authors take more than two months to respond to their proofread corrections! Anyway, the suggestion for bi-monthly publication is still active.

Let us then enjoy again reading four brilliant issues in 2010. The V3/N4 of IJAAC consists of five papers. The titles are as follows.

- 1 Vector control techniques for induction motor drive: a review.
- 2 Model-order reduction based on artificial neural networks (ANN) for accurate prediction of the product quality in a distillation column.
- 3 Autopilot design for flexible aerospace vehicles with experimental results.
- 4 Vibration control of 2-mass mechatronic system with low inertia ratio.
- 5 Model-based fault diagnosis, fault tolerant control and reconfiguration of hydraulic and thermo-fluid processes using analytical redundancy.

At the outset, the first paper presents a literature survey on the vector control techniques for the induction motor drive. In particular, various vector control techniques based on digital control, model adaptive reference control, intelligent control, sliding mode control and decoupling control are described. The authors have attempted to provide a guideline and references to the researchers and practicing engineers who are working in the area of vector control. The basic principles of the field oriented controlled methods for induction motor drive are reviewed. Further, various modern control techniques used in vector control drive are presented in the sequel. The authors acknowledge that the parameter variation should be an important issue in the vector control techniques. This paper also presents the future research directions based on the review of previous work in the parameter adaptation for the direct and indirect vector control method.

In the second paper, autopilot design principles are presented. The authors talk about flexibility issues with regard to autopilot design for aerospace vehicles. The research area is challenging because the dynamic structural vibrations cause instability. The authors have shown through the experimental results that quantitative feedback theory (QFT) approach can be effectively used to design an autopilot accounting for structural bending vibrations. They also argue that although both factorisation and QFT design approaches provide satisfactory result, the factorisation design is simpler than that of QFT. The type of aerospace vehicles considered here includes non-agile thrust vector control flexible aerospace vehicles. The authors would like to consider aerodynamically controlled agile vehicles for future research.

It became a say now that the *chemical industries are characterised by non-linear processes*. How far can we overcome this barrier? Thousands of authors have already put their efforts to overcome this since the birth of the automatic control. New researchers are emerging everyday and are living with it and are trying to solve the problem in a better way. Here is what the authors of paper no. 3 like to say. They have repeated the same sentence “it is often difficult to obtain non-linear models that accurately describe a plant in all regimes”. On the other hand, the authors have established a reliable model of a process behaviour both for the steady-state and unsteady-state regimes. The use of their model allows distinguishing a normal mode from an abnormal one. They have chosen neural black-box identification by means of a non-linear auto-regressive with exogenous (NARX) model. In essence, this study shows another technique for neural model reduction to account the physical knowledge of the process. Experiments are performed in a distillation column and experimental data are used both to define and to validate the model.

Researches on vibration compensation of machineries and systems have been since long. If I remember correctly, one of our PhD students tried to compensate the vibration of a high speed spindle shaft by using an innovative technique what he called electromagnetic exciter-based vibration compensation. That was interesting, and in fact he was able to reduce the vibration of the rotating shaft from 11 to 7 μm and it was well published in the American Society of Precision Engineers in 2001. However, the work that the author has presented in paper no. 4 of this issue illustrates a mathematical analysis of mechanical vibrations, induced in hoisting mechanisms driven voltage-controlled three-phase induction motors. A new closed-loop control system for minimising torsional vibrations has been proposed in his work. Hoisting mechanism driven voltage-controlled three-phase induction motor was chosen as the experimental platform of two-mass mechatronic system that has low inertia ratio. The control incorporates feedback of the speed difference of masses. In particular, a formula that would calculate the optimum feedback gain of the speed difference was derived.

The last but not least the final paper of this issue presents work in the areas of fault detection and isolation (FDI). That what a control engineer has to accomplish in order to maximise the efficiency, productivity and safety of a plant or system. Model-based FDI methods are very popular. The pioneer works by Isermann, Frank, Moore, Basseville, Patton, Blanke, Gertler, Evans, Henry and many others can be referenced. Here, in this paper the author has discussed about the model-based fault diagnosis, fault tolerant control, and reconfiguration of hydraulic and thermo-fluid processes using analytical redundancy. In particular, the bond graph modelling, which allows unified representation of multi-energy domain of system dynamics is used to develop model-based quantitative FDI schemes. The author has also considered some issues of fault tolerant control as well as system reconfiguration in the simulation.