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Guest Editorial

I would like to thank Professor Michael Wald for his invitation to edit this special issue of the International Journal of Engineering Education on MATLAB/Simulink applications in Engineering Education. I would also like to thank Rebecca Porter of the MathWorks, Inc. Corporate Communications for her important role in making this issue successful. Many thanks are due to the numerous prominent educators and MATLAB experts who helped as anonymous reviewers. The interest of Jim Tung in this special issue and his introduction titled MATLAB and Simulink in Engineering Education are highly appreciated. The encouragement of Professor Bogdan Wilamowski is particularly valued. Finally, I would like to thank all the authors who took the time and put the effort to present such valuable contributions.

The papers of this special issue span a wide range of topics in engineering education. They address teaching and learning using MATLAB/Simulink in areas that include signal processing, electronics, communications, electromagnetics, neural networks, fuzzy logic, chemical engineering, food processing engineering, biomedical engineering, civil engineering, control systems, mechatronics, mechanical engineering, and vehicle engineering. Education methods, laboratory development, and focused tutorials are also included. In many cases, however, it is difficult to define sharp boundaries among these labels used as convenient designations for topics. It is particularly interesting that the contributions come from educators in numerous countries including Bahrain, Canada, Cuba, India, Ireland, Italy, Lebanon, Malaysia, New Zealand, Portugal, Singapore, Slovenia, Spain, Sweden, Trinidad, Turkey, USA, and Venezuela.

It is hoped that the readers will find this issue interesting and useful regardless of the specific area of engineering in which they may be particularly interested and regardless of their previous experience with MATLAB and Simulink.

The papers of this special issue appear in two parts: Vol. 21, No. 4 and Vol. 21, No. 5. In this part (Vol. 21, No. 4) there are 15 papers. The following is a quick overview of them.

The first five papers address aspects related to teaching and learning signal processing. Wilamowski and Gottiparthy discuss the synthesis of both active and passive analog filters using MATLAB, the objective being to relieve students from mechanical computation so they can focus on the understanding of the design algorithms and hence enable more material to be covered. The authors describe an easy to add and independent MATLAB-based software package that has advantages over other packages of similar purpose.

Jiang, Wiklund, and Haykin introduce a Simulink laboratory package for teaching and learning adaptive filtering concepts. The labs are presented as Simulink applications where students can experiment with varying the parameters and observing the results.

Muddeen and Gabriel introduce a blockset that enables students to simulate various digital signal processing systems. They report that further development of the package is underway with excellent preliminary results.

Gan and Kuo discuss a two-level approach using MATLAB and Simulink for teaching digital signal processing starting with basic concepts and reaching the level of developing DSP software for real-time implementations on programmable DSP processors.

A rapid control prototyping system is introduced by Hercog and Jezernik. They discuss a system that combines MATLAB/Simulink and a custom DSP-based floating point motor controller.

Varadarajan and Valsan introduce the MatPECS, which is a MATLAB-based simulation package developed to facilitate the classroom teaching of power electronics.

Two papers that relate to the incorporation of MATLAB in teaching communications are presented by Zhang *et al*. and Lim & Wong. The first discusses an approach to teach an introductory course and the second discusses teaching practicing engineers and graduate students.

Making electromagnetics more approachable to students involved in advanced design studies is discussed by Singh *et al*. They outline a MATLAB-based graphical user interface software for electromagnetic field calculations using finite difference time domain algorithms.

Three papers address the various aspects of teaching and learning neural networks and fuzzy logic. Dua *et al*. introduce a MATLAB-based approach to teaching and learning neural networks that would help students whether or not they have experience with neural networks. The approach emphasises the physical understanding and application of neural networks concepts rather than the mathematical details.

Übeylí and Güler present an approach to teaching the concept of automated diagnostic systems to biomedical engineering students based on the use of multilayer perceptron neural networks and adaptive neuro-fuzzy inference system. MATLAB exercises assist students to better understand the various automated diagnostic systems in blood flow signals.

Riverol *et al.* describe an undergraduate MATLAB-based control laboratory course aimed to teach the application of fuzzy logic control and neural networks in food processing.

Modelling chemical engineering laboratory experiments and using MATLAB/Simulink to solve chemical engineering problems numerically are discussed by García *et al*. They explain that a new laboratory plant for university students has been developed with a MATLAB-aided solution, and point out that the combination of theory, experimental results and simulation improves learning and safety.

Öhrström *et al*. discuss the role of MATLAB in implementing a new approach at Chalmers University of Technology, Sweden that integrates Chemistry and Mathematics teaching. They detail the pedagogical merits of presenting real chemical problems that could be solved using applied mathematics with the assistance of MATLAB.

The final paper of this part of the special issue is Learning MATLAB: Evaluation methods and materials for first year students by Wallin *et al*. The authors describe the development of a MATLAB course as part of a first year in the MSc programme in vehicle engineering at the Royal Institute of Technology, Sweden. The objective of the course is to provide core engineering knowledge and experience to prepare the students for their studies in engineering mechanics and vehicle engineering.

Another set of 15 papers for this special issue on MATLAB/Simulink Applications in Engineering Education will appear in Vol. 21, No. 5.

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