

Preface

Power electronics has entered the curriculum of undergraduate electrical engineering as a subject over two decades ago. During the past decade, several universities have introduced post-graduate degrees with specialisation in power electronics. A number of Indian industries have been introducing into the market place an ever-increasing number of power electronics products. The growth of academic research and industrial development in this area has been substantial. Two special issues of the *Journal of the Indian Institute of Science* have been planned to present the diverse development and research work that is going on at the Indian Institute of Science, Bangalore, in the area of power electronics.

Power electronics is becoming an enabling technology in several disciplines. The paper entitled "A new bidirectional topology for electric vehicles" by R. Gautam *et al.* covers the application of inverters to electric vehicle drives. Another paper by L. Umanand extends the application of bondgraph theory to power electronics systems.

Switched reluctance motors are attracting more attention recently as an industrial drive, on account of several positive features. The paper entitled "Modelling and simulation of switched reluctance motor drive" by Debiprasad Panda and V. Ramanarayanan covers the extensive work done in this area.

As the switching frequencies are pushed to higher and higher limits, lossless resonant switching applications are on the rise. A paper by Biju S. Nathan and V. Ramanarayanan outlines the design methodology for series resonant converters featuring zero-voltage switching.

The availability of low-cost digital hardware has made possible several efficient modulation techniques for inverters employed. The paper entitled "Triangle comparison and space vector approaches to pulsewidth modulation in inverter fed drives" by G. Narayanan and V. T. Ranganathan covers novel modulation techniques and their effectiveness at high power.

The paper "A modified area-product method for the design of transformer and inductor" by G. S. Ramanamurthy and V. Ramanarayanan covers computer-aided design of electromagnetic elements in power electronics systems. The iterative approach claims better utilisation of the materials employed in the electromagnetic elements.

"Rotor side control of grid-connected wound rotor induction machine" by Rajib Datta and V. T. Ranganathan breaks fresh ground for wind-energy applications through a novel control method leading to better utilisation of the machine, power converter as well as the available wind potential.

Modern power devices require close protection in order to exploit their full features in any application. A paper by G. Narayanan *et al.* covers the short-circuit protection of IGBT devices.

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