

Weekly Research Seminar Series

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Induction Machine Drive Technology

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Abstract

Electrical motors have widespread applications ranging from rudimentary motion control to high-precision machine tools and robotics. They are used in many household appliances such as blenders, lawn mowers, washing machines and refrigerators. Larger electrical motors are used in industry in applications such as conveyors belts, pumps and compressors.

Prior to 1950s, most of such applications required the use of a direct current (DC) motor since alternating current (AC) motors were not capable of true adjustable or smoothly varying speed at that time. However, innate disadvantages of DC motors, such as intricate manufacturing process and high maintenance overhead, have prompted continual attempts to find better solution to the problem of AC motor controllability. The control of AC motors has also experience rapid expansion caused by the advances in semiconductor technology in the form of power electronics as well as analogue and digital signal electronics. Together with their exceedingly simple and rugged construction, AC motors have gradually replaced DC motors as the mainstream electrical motor system.

The dynamic model of the Induction Machine, which is crucial in the design of various forms of machine drives, will be presented. This is followed by a discussion of current drive technologies with specific highlights of the Direct Torque Control (DTC) technology.

WHEN:	Date, (Slot 1 3:30-4:00 PM, Slot 2 4:00-4:30 PM)
WHERE:	Room 4.07

About the Speaker

Dr. Wong read his doctorate degree in induction motor drives and control at Bristol Laboratory for Advanced Dynamic Engineering (BLADE), Bristol University, UK. In his research, Dr. Wong investigated several problems plaguing Direct Torque Control (DTC) induction motor drives and has suggested several methods to mitigate these problems. He also successfully implemented the Minimal Controller Synthesis (MCS), an advanced adaptive control technique first developed in the 90s in the same laboratory, to control the induction motor. He won the Institution of Electrical Engineers UK (IEE) Postgraduate Scholarship in 2000 to aid his research.

Prior to his lecturership in Swinburne Sarawak, Dr. Wong was employed as a Researcher at BLADE. He was involved in the setting up of the Micro Electro-Mechanical Systems (MEMS) Research Team, which pioneered the research and development of a controlled, self-levitating, micro motor in the UK. His team investigates the design, fabrication and control of micro-motor with features from a few microns to a few tenths of a millimetre in size, with target specifications to suit the perceived application of the micro-motor in micro-gyroscope and micro-turbine.