



**IEEE Lecture by Prof. Gopakumar. K.**  
**IEEE Power Electronics Society Distinguished Lecturer**

**Venue:** Room 408, Level 6, Building 11 (CB11.06.408)  
University of Technology Sydney

**Time:** 5:00 pm, Thursday, 25 July 2019

**Polygonal Voltage Space Vector Generation Using Switched Capacitive Filters for Drive Applications**

GOPAKUMAR. K.

Department of Electronic Systems Engineering, Indian Institute of Science (IISc)  
Bangalore 560012, India

E-mail: [kgopa@iisc.ac.in](mailto:kgopa@iisc.ac.in)

**Abstract**

Multilevel inverters are preferred for variable speed drives due to its improved output voltage profile, less low order harmonic content and low  $dv/dt$  requirements for the devices, etc.;. But the conventional multilevel voltage space vector structure has a hexagonal profile, and it introduces the low order (fifth and seventh) harmonics especially in the over modulation region. In this respect, dodecagonal voltage space vector structure with increased modulation range and suppression of the fifth and seventh order harmonics is a viable alternative for the conventional hexagonal structure for the voltage space vector structure, for PWM control. The dodecagonal voltage space vector structure generation for an induction motor drive with open-end structure will be introduced in the first part of the lecture, and then it will be extended to the normal three-phase IM drive using a switched capacitive H-bridge acting as a fifth and seventh order harmonics, throughout the modulation range, in this talk. The switched capacitive filter with a capacitive fed H-bridge will only supply reactive energy, and the capacitor voltage can be balanced during the PWM control without any complexity. The same concept can also be extended for octadecagonal and other higher levels of voltage space vector generation using the basic inverter modules.

GOPAKUMAR. K.



Personal Page: <http://kgopakumar.dese.iisc.ac.in/>

Department of Electronic Systems Engineering

Indian Institute of Science (IISc)

India

Phone : +91 80 23600810 Ext 234 (off.)

Email : [kgopa@iisc.ac.in](mailto:kgopa@iisc.ac.in)

### **Biography:**

K. Gopakumar received the B.E., M.Sc. (Engg.), and Ph.D. degrees from the Indian Institute of Science, Bangalore, India, in 1980, 1984, and 1994, respectively. He employed at the Indian Space Research Organization, Bangalore, India from 1984 to 1987. He currently holds the position of professor at the Department of Electronic Systems Engineering, Indian Institute of Science, India. His research interests include PWM converters and high power drives.

Dr. Gopakumar. K. is a Fellow of IEEE, and also a Distinguished Lecturer of IEEE Industrial Electronics Society (IES). He is a fellow of both Institution of Electrical and Telecommunication Engineers, India and Indian National Academy of Engineers, India. Currently, Gopakumar. K. is an Associate Editor of IEEE Transaction on Industrial Electronics, and he was the Co-Editor –in –Chief of IEEE Transactions on Industrial Electronics. Gopakumar. K. offers his service to the industry as a consultant and completed several industry projects.