Tsuneo Kume (M'68, LM'03, LSM'04, LF'05) received the B.S. degree in electrical engineering from Waseda University, Tokyo, Japan in 1960. In the same year, he joined Yaskawa Electric Corporation, Kitakyushu, Japan. From 1966, he was on a leave of absence to study at the University of Missouri, Columbia, Mo., USA, where he received the M.S. and Ph.D. degrees both in Electrical Engineering in 1968 and 1970, respectively.

After returning to Yaskawa Electric, he was engaged in R&D projects for variable frequency inverter drives as project leader, and later as manager. He developed the first commercially produced general-purpose transistor PWM inverter in 1974. He also played a key role in the development of the first vector-controlled PWM inverter in 1979, which was presented at the IEEE/IAS annual meeting held in Toronto, Canada, in 1985 and published in the IEEE transactions on Industry Applications, Vol. IA-23, No. 5, September/October 1987. Establishment of the vector control technology for induction motors was soon followed by real product applications to the pinch roll drives for continuous casting system in steel production plants as well as spindle drives of machine tool, both replacing the dc motor. While engaged in these projects above, he played advisory rolls in developments of the neutral-point clamped three-level inverter and the matrix converter.

He also proposed the winding changeover technique of induction motor to expand its speed control range. Its combination with the vector control drives realized elimination of the gearbox from some types of machine tools, resulting in highly improved productivity and machining quality.

He moved to the U.S. in 1996 and stayed there until 2006 as director of R&D at Yaskawa Electric America, Inc. In the US, he continued his R&D career in the field of power electronics, while conducting advisory works to application engineers. His publications in IEEE/IAS and other conferences during this period include the quick stopping of an induction motor by means of the high negative-slip concept without relying on any additional circuit, new electronic winding changeover technique and the output filter that mitigates unfavorable influence of PWM such as surge voltage at the motor terminals, leakage current and shaft voltage/bearing current. The electronic winding changeover technique enables quick and seamless transition from one winding combination to another, leading to operation in higher speed range due to lowered counter emf of the motor. It can be applied to the induction motor as well as permanent magnet synchronous motor.

He is an active member of IEEE and IEEJ, attending major conferences on the power electronics and motor drives in the world. He received the 2007 Honorable Mention award for his paper entitled "Integrated Filters and Their Combined Effects in Matrix Converter," published in the Transactions on Industry Applications. He also played leading roles in publishing books (in Japanese), "Semiconductor Power Conversion Circuit" in 1987 and "Power Electronics Handbook" in 2002. These books are very popular references for graduate studies in Power Electronics in many universities and for practicing engineers.

Currently, Dr. Kume is technical advisor to Yaskawa Electric Corporation, Japan.

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Lecture Topics

1. Power topologies in practical use for variable frequency motor drives.
   - Basic PWM transistor inverter and its applications.
   - Three-level PWM inverter that is friendlier to environment.
   - Direct dc-to-dc converter (matrix converter)
   - Multi-level matrix converter for four-quadrant drive of medium-voltage motors.

2. Peripheral technologies that contribute to sophistication of variable frequency ac motor drives.
   - Filter technologies that reduce unfavorable influence of PWM to surrounding environment.
   - Winding changeover technique for extending the speed control range of ac motors.
   - Current harmonics mitigation in rectifier circuit with large smoothing capacitor.
   - Quick stopping of an induction motor by loss generation in it.