



**University of Pavia**

**Ph.D. School of Electrical and Electronics Engineering and Computer Science**

## **SEMINAR**

# **New hybrid excited synchronous machines for electric vehicles**

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**Abstract:** So far, the majority of electric vehicles (EVs) are based on DC machines, permanent magnet (PM) machines or induction machines (IM). At present, IM machines are widely accepted and most commonly used for the purposes of EV propulsion systems due to their reliability and easy maintenance, even though they have relatively low power density. Therefore, PM machines with their excellent performance become more and more popular and suitable for EV drives, mainly due to high efficiency, as compared to other machine types. However, they suffer from uncontrollable magnetic flux, which limits the constant power operation, especially in high speed regions. Optimal motor drives for hybrid or battery EV applications should offer a significant field weakening capability, which can be achieved with the proper machine geometry design and field weakening control strategies.

The lecture discusses new developed hybrid excited synchronous machines exhibiting a field control capability. Additionally, other designs of PM-excited synchronous machines will be presented and compared.

**Bio:** **Richard Palka** received the M.Sc., Ph.D. and D.Sc. degree in Electrical Engineering from the University of Szczecin (Poland), University of Poznan (Poland) and University of Warsaw (Poland) in 1976, 1979 and 1986, respectively. From 1988 to 2005, he was at the Institute of Electrical Machines, Traction and Drives, Technical University of Braunschweig (Germany). Currently, he is a full Professor with the Faculty of Electrical Engineering, Department of Power Systems and Electrical Drives, West Pomeranian University of Technology, Poland.

His research interests include electromagnetic field theory, numerical techniques, high-temperature superconductivity and electrical machines. He authored or co-authored more than 240 papers.

He is a member of International Compumag Society, Polish Society of Theoretical and Applied Electrical Engineering, Polish Society of Applied Electromagnetism, Societas Humboldtiana Polonorum (vice-President) and Committee on Electrical Engineering, Polish Academy of Sciences.

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Seminar in English

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