



Advanced Electrodynamics : from high speed electrical machines to smart electroactive structures

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Short description of the lecture:

Modern electrodynamics is a key knowledge for the development of innovative technologies in the field of electric machines and actuators. Advanced solutions concern various strategic application areas such as flight control actuation systems, electric generators for high performance embedded systems, medical electroactive prosthesis... In this special course, the thermodynamic aspects of electromechanical energy conversion will first be discussed. Then, the various physical phenomena enabling an efficient electromechanical coupling (electromagnetic, piezoelectric, magnetohydrodynamic...) will be classified and compared in terms of energy density. The basic conversion processes will then be described and characterized through appropriated modelling methods, showing their feasibility limit and enhancement trends. The lecture will be illustrated thanks to several precise appliances examples.

Contents:

1. Electrodynamics : an interdisciplinary science
2. Electromechanical energy conversion : thermodynamical approach
3. Classification of the various electromechanical coupling effects
4. Comparison in terms of energy and power densities
5. Basic topologies of high performance electric machines
6. Feasibility limit of classical structures
7. Reliability of electromagnetic energy converters
8. Alternative technologies : from piezoelectric ceramics to smart electroactive structures
9. Application examples : flight control actuation systems, miniaturized electroactive pumps for medical circulatory support



Terminy wykładów			
Data	Dzień tyg.	Godzina	Sala
2015-09-07	Pn	9.15-12.00	EiA E28
2015-09-08	Wt	9.15-12.00	EiA E28
2015-09-09	Śr	9.15-12.00	EiA E28
2015-09-10	Cz	9.15-12.00	EiA E28
2015-09-11	Pt	9.15-12.00	EiA E28