Filtration and separation in electric systems - opis przedmiotu

Informacje ogólne

Nazwa przedmiotu	Filtration and separation in electric systems
Kod przedmiotu	06.2-WE-ELEKTP-FSinES-Er
Wydział	Wydział Nauk Inżynieryjno-Technicznych
Kierunek	Elektrotechnika
Profil	ogólnoakademicki
Rodzaj studiów	Program Erasmus pierwszego stopnia
Semestr rozpoczęcia	semestr zimowy 2019/2020

Informacje o przedmiocie

Semestr	6
Liczba punktów ECTS do zdobycia	4
Typ przedmiotu	obieralny
Język nauczania	angielski
Sylabus opracował	• dr hab. inż. Krzysztof Sozański, prof. UZ

Formy zajęć

Forma zajęć	Liczba godzin w semestrze (stacjonarne)	Liczba godzin w tygodniu (stacjonarne)	Liczba godzin w semestrze (niestacjonarne)	Liczba godzin w tygodniu (niestacjonarne)	Forma zaliczenia
Wykład	30	2	-	-	Zaliczenie na ocenę
Laboratorium	15	1	-	-	Zaliczenie na ocenę

Cel przedmiotu

Basic knowledge of: analog passive filters and active analog filters understanding and designing.

Understanding and designing of galvanic isolation in power electronics circuits.

Wymagania wstępne

Circuit Theory

Zakres tematyczny

Analog signal processing. Analog circuits, linear two-port network. Continuous-time filters. Filter parameters. Introduction to analog filter design. Properties of electrical filters. Continuous-time (analog) filters. Active and passive circuits. Designing of passive RLC filters: Butterworth, Chebyshev, Bessel, elliptic (Cauer). Sensitivity to filter parts tolerance. Active analog filters. Digital filters: linear and nonlinear filters. Properties of digital filters: finite impulse response filter (FIR), infinite response filter (IIR). Design of digital filters. Round off effects in digital filters. Implementation of digital filters using digital signal processors. Switched Capacitor (SC) filters. Design of analog filters for power electronics circuit. Model of passive parts used in power electronics circuits. Capacitors for high pulse stressing value and high currents. Capacitor models. Resistors. Magnetic materials: ferrite, amorphous alloy, powder, classical iron, air. Properties of winding and magnetic core. Eddy current losses in magnetic core. Inductor and transformer design. Eddy currents in conductors. Signal separation in power electronics circuits. Voltage and current measurements. Parameters: input-output momentary withstand voltage, common mode transient immunity, input-output capacitance, isolation class. Galvanic isolation: magnetic, capacitance, optic, piezoelectric. Galvanic isolation of analog and digital signals. Review of specialized integrated circuit used for galvanic isolation. Coupling power parts with control circuit. High common mode transient immunity. Galvanic isolated power supply sources. Design and simulation of analog filters using program Matlab. Energy measurements integrated circuits. Parameters. Single-phase and tree-phase circuits. Review of integrated circuits.

Metody kształcenia

Lecture – the main condition to get a pass are sufficient marks for all exercises and tests conducted during the semester.

Laboratory – the main condition to get a pass are sufficient marks for all exercises and tests conducted during the semester.

Efekty uczenia się i metody weryfikacji osiągania efektów uczenia się

Opis efektu	Symbole efektów	Metody weryfikacji	Forma zajęć
Can design simple analog and digital filters		• wykonanie sprawozdań laboratoryjnych	• Laboratorium
Has an elementary knowledge on the analog and digital filters		• wykonanie sprawozdań laboratoryjnych • zaliczenie - ustne, opisowe, testowe i inne	• Wykład • Laboratorium
Has an elementary knowledge on the application areas of signal separation		• kolokwium	• Wykład

Warunki zaliczenia

Lecture – in order to get a credit it is necessary to pass all of the required tests (oral or written).

Laboratory – the main condition to get a pass are sufficient marks for all exercises and tests conducted during the semester.

Calculation of the final grade: lecture 60% + laboratory 40% .

Literatura podstawowa

1. Proakis J. G., Manolakis D. M., Digital Signal processing, Principles, Algorithms, and Applications, Third Edition, Prentice Hall Inc., Engelwood Cliffs, New Jersey 1996

2. Kazmierkowski M. P., Kishnan R., Blaabjerg F., Control in Power Electronics, Academic Press, 2002

3. Sozański K. Digital Signal Processing in Power Electronics Control Circuircuit, second edition, Springer Verlag, 2017

4. Mohan N., Undeland, T. M., Robbins W. P., Power electronics, John Wiley & Sons, Inc., 1995

5. Van den Bossche A., Valchev V. C., Inductors and Transformers for Power Electronics, CRC Press, Taylor & Francis Group, 2005

6. Attia J. O., Electronics and Circuit Analysis using Matlab, CRC Press, 1999

7. Paarmann L. D., Design and Analysis of Analog filters, a Signal Processing Perspective, with Matlab Examples, Kluwer Academic Publishers, 2001

Literatura uzupełniająca

Uwagi

Zmodyfikowane przez dr hab. inż. Krzysztof Sozański, prof. UZ (ostatnia modyfikacja: 04-11-2019 16:23)