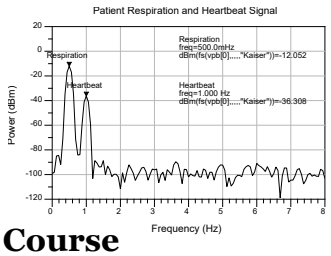
TNE071 Microwave Engineering

6 hp, Autumn 2019

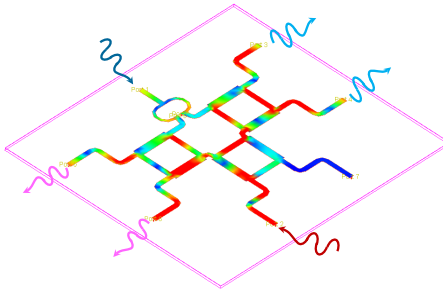
Goal

TNE071 is a eligible advanced course for undergraduate students in Electrical- and Communication Engineering programs and, since 2010, for PhD students.

Beyond the first courses in Electromagnetics or your last research article, there is a world of challenging applications, where new ideas become reality. Understanding microwave signals and being skilled to design devices and systems that accurately process them, open the door to all modern technology. It has started with Maxwell's but the question is what can we do today, further, with all our knowledge, the new technologies that enable new components? Answering these questions is the challenge for us, in this course.



Left: Detection of vital signs
Right: Controlling the waves. Electromagnetic simulation of a correlator in ADS.



The Course

- Key aspects treated in lectures and seminars include microwave passive and active circuits, microwave communication systems, different types of radars, low-power microwave signals processing. Supporting recapitulation of Electromagnetic Theory, Transmission Lines, etc., assures the flow of the course towards modern applications of microwave technologies.
- Some course moments are flexibly adapted to the students' background and interest.
- Special attention is directed toward *microwave sensors* using radar technology approach for modern applications. e.g., vital-signs wireless detection and Angle-of-Arrival (AoA).
- Several moments of the course will be supported by recent scientific papers, and research activity at LiU, Campus Norrköping.
- A mini-project work and short report will conclude the Laboratory Sessions (4 x 4 h).
- Project example: A microwave sensor in form of a monostatic radar front-end is modelled, simulated and designed in ADS. Application for vital signs detection. Manufacturing of prototypes is possible.

Organization and Information

- The course contains lectures, seminars and laboratory sessions.
- Written, open book examination. For PhD students, a seminar is proposed.
- Course literature: David M. Pozar, Microwave Engineering, scientific papers.
- Web link: https://liu.se/studieinfo/kurs/tne071/ht-2019

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