Measurement Science and Technology

2 units (selection)

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Target⟩ To understand importance of the Fourier transformation for developing various kinds of measurement techniues, measurement equipments, measurement systems.

Outline⟩ Among the various measurement techniques used in the fundamental and applied research, optical measuremnt methods including their principles, methodologies, instrumentations, and evaluation methods are reviewed. In the lecture, emphasized is the importance of the concept of the Fourier transformation to understand and to deal with linear systems in the modern scientific measurement system. Practical methods of object inspections, distance measurements, and shape reconstructions using images are also lectured.

Style⟩ Lecture

Keyword⟩ *measurement techniques, measurement devices, Fourier transform*

Relational Lecture⟩ "**Micro-Nano Engineering**"(0.5), "**Digital Control Theory**"(0.5), "**Actuator Control Theory**"(0.5)

Goal⟩

1. 1. To understand Fourier series and Fourier transform.
2. 2. To understand relarions among Fourier transform and measurement principles of scientific instruments.
3. 3. To understand techniques used with practicable various mearurement devices.

Schedule⟩

1. Frequency response of the amplifier
2. Optical information processing
3. Fourier-transform infrared spectoroscopy
4. Subfringe interferometry
5. Computed tomography
6. Sampling theorem and quantization theorem
7. Wavelet transformation
8. Lock-in amplifier and boxcar integrator
9. Optics for microscope
10. X-ray diffration
11. Image measurement systems
12. Feature extraction from images
13. Binocular stereo method
14. Pattern projection
15. Shape from shading and texture
16. Examination

Evaluation Criteria⟩ Assignments count 50% and examinations count 50%.

Textbook⟩ Printed synopses are used.

Reference⟩ To be introduced in the class.

Contents⟩ http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=216629

Student⟩ Able to be taken by only specified class(es)

Contact⟩
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