

Energy and Environment Engineering

2 units (selection)

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Target) Aeroacoustic represented to high speed Shinkansen is complex in its generation mechanism and is still in investigation. This class aims to understand the theory of the generation mechanism and turbulence phenomenon underlying it.

Outline) Latest energy and environment problems in Japan and the world. Alternative energy sources for fossil fuels which are origins of green house effects. Fluid energy transfer machines. Systems of nuclear and sustainable energy machine. Harmony of energy consumption and environment problem. Aerodynamic response of sound and vibration, and turbulent properties of fluid machines. Lecture in combination with Portfolio.(2unit)

Style) Lecture in combination with Portfolio

Keyword) *aeroacoustics, flow-induced vibration, viscous fluid, turbulence*

Fundamental Lecture) “Applied Fluid Dynamics”(1.0), “Fluids Energy Conversion Engineering”(1.0)

Requirement) Students are required to have a good understanding of fundamental knowledge of fluid mechanics.

Goal) This class aims to train researchers for universities and companies

Schedule)

1. Outline of aeroacoustic
2. What is a vortex sound?
3. Basic equations of fluid dynamics and acoustics
4. Green function for free space
5. Physical meanings of monopole, dipole and quadrupole
6. Lighthill's equation and Curle's equation
7. Radiation sound from compact body
8. Summary and intermediate test
9. Viscous fluid and boundary layer
10. Laminar flow, turbulent flow and transition
11. Description of turbulence
12. Fundamental equations for turbulence
13. Wall turbulence
14. Free turbulence

15. Homogeneous and isotropic turbulence

16. Final examination

Evaluation Criteria) Attitude for attending class (30%) and two examinations (70%) are evaluated.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=216568>

Contact)

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