Heat, aero and structure dynamics of cogeneration engines – 15 hrs

dr hab. inż. Piotr Lampart (IMP PAN)

Conspect for the lecture series on:

(05.12.2011) Hrs. 1-3:

Thermodynamic cycles of cogeneration engines

- Examples of cogeneration engines,
- Working media,
- Perfect gas properties, thermodynamic changes of perfect gases,
- Thermodynamic cycles of combustion piston engines,
- Gas turbine thermodynamic cycles,
- Steam properties and thermodynamics,
- Rankine cycles for steam power stations,
- Organic Rankine cycles,
- Refrigeration media and cycles.

(07.12.2011) Hrs 4-6:

Aerodynamics of gas/steam turbines I

- Turbine blading systems,
- Flow efficiency,
- Sources of aerodynamic losses in blading systems,
- Boundary layers and profile losses,
- Mixing processes,
- Shock waves and supersonic flow losses,

(09.12.2011) Hrs 7-9:

Aerodynamics of gas/steam turbines II

- Endwall flows and losses,
- Tip / root leakage flows and losses,
- Unsteady flow losses,
- Multistage configurations,
- Aerodynamics of cogeneration turbines,
- Partial admission turbines.

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Hrs 10-11:

Gas/steam turbine heat transfer

- Turbine heat load and types of heat transfer,
- Steady and unsteady heat conduction problems,
- Heat transfer at natural and forced convection in turbomachinery channels,
- Droplet and film condensation heat transfer in steam turbines,
- Coolant flow and heat transfer in gas turbines,
- Boiling in flow,

(14.12.2011) Hrs 12-13:

CFD modeling of flow and heat transfer.

- Laminar/turbulent flows,
- RANS turbulence closures
- Boussinesq hypothesis,
- Two or more equation models (mechanical and thermal turbulence),
- Reynolds Stress and Turbulent Heat Flux models,

(16.12.2011, 12.15) Hrs 14-15:

Structure and dynamic problems in turbomachinery

- Rotor blades and their fixing,
- Centrifugal forces, mechanical and thermal stresses in blades,
- Stresses in bladed rotor disks,
- Unsteady forces acting on rotor blades, high and low frequency excitations,
- Problems of rotor shaft dynamics,

TERMINY WYKŁADÓW *(aktualizacja 12.12.11)*			
Data	**Dzień tygodnia**	**Godzina**	**Sala**
05.12.2011	Poniedziałek	12-15	115 IMP PAN
07.12.2011	Środa	12-15	115 IMP PAN
09.12.2011	Piątek	12-15	115 IMP PAN
14.12.2011	Środa	12.15-15	115 IMP PAN
19.12.2011	Poniedziałek	12.15-15	115 IMP PAN

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