ESF II project of the University of West Bohemia in Pilsen

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Examples to practice - 3

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Example 1

Calculate the specific steam consumption for a 200 MW unit operating with steam with input parameters p_a = 17.8 MPa and t_a = 540 ° C. The parameters at the turbine outlet are p_k = 0.004 MPa and x = 0.95. The block has one reheating of steam at a pressure p_p = 3.6 MPa from a temperature of 340 ° C to a temperature of 540 ° C. The condensate temperature is 29 ° C. The mechanical efficiency is 0.96 and the generator efficiency is 0.97.

Example 2

The classic condensing block with steam reheating works with the parameters of admission steam: 18 MPa, 450 ° C and the pressure of the emission steam is p_e 5 kPa. After expansion in the high-pressure part of the turbine, the steam is reheated isobarically at a pressure of p_p = 5 MPa. How does the amount of heat supplied to and removed from the circulation change compared to the thermal cycle without reheating the steam?

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Example 3

Solve the thermal circulation of the power plant with reheating, which has the following parameters:

- Admission steam: 9 MPa and 480 °C
- Heated steam: 2.7 MPa and 480 °C
- Emission steam: 4 kPa
- Thermodynamic efficiency of high pressure turbine part 0.85 and low pressure turbine part: 0.8 (-)
- Electrical power at the generator terminals: P_e = 25 MW
- Fuel calorific value: 12,000 kJ/kg
- Mechanical efficiency of the turbine: 0.96 (-)
- Generator efficiency: 0.97 (-)
- Boiler efficiency: 0.85 (-)

(i.e. calculation of efficiencies, amount of steam, amount of fuel, amount of cooling water)

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Used and recommended literature

- Dvorsky, Emil; Hejtmankova, Pavla; Kocmich, Martin. Elektrarny : zaklady vyroby elektricke energie : priklady. 1. vyd. Pilsen : UWB, 1994. ISBN 80-7082-133-7.
- Dvorsky, Emil; Hejtmankova, Pavla. Elektrarny : zvysovani ucinnosti premen energie v tepelnych elektrarnach : priklady. 1. vyd. Pilsen : UWB, 1999. ISBN 80-7082-523-5.

- …… and other literature listed in the course syllabus on the website Portal of the UWB in Pilsen

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