Universität Stuttgart
Institute of Nuclear Technology
and Energy Systems

Master Thesis

Thermodynamic Design and Optimization of a Recompression sCO_2 Cycle

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Objective:

The objective of this work is to determine the optimized thermodynamic design of a supercritical (sCO_2) recompression cycle.

Background:

sCO_2 is a promising working medium for various next-generation applications, both in the field of renewable and conventional power generation (project sCO2-flex, SOLARSCO2OL, ShunShot, Misha) and in residual heat removal (project sCO2-4-NPP).

Within the scope of this work, the thermodynamic design of a recompression sCO_2 cycle is investigated and optimized under various boundary conditions and constraints. Starting from a recuperated cycle layout, which was optimized in previous work, the additional components of the more complex recompression cycle are added to the calculation routine in Matlab. Then, the optimized thermodynamic design is determined for different boundary conditions and constraints.

Approach:

- Literature study on recompression sCO_2 cycles
- Familiarization with the existing Matlab code
- Extension of the code to incorporate the new components
- Optimization considering different boundary conditions and constraints
- Thesis preparation and presentation

Requirements:

- Fundamentals of thermodynamics
- Experience in programming preferably in Matlab
- Analytical thinking and self-initiative

Start: as soon as possible

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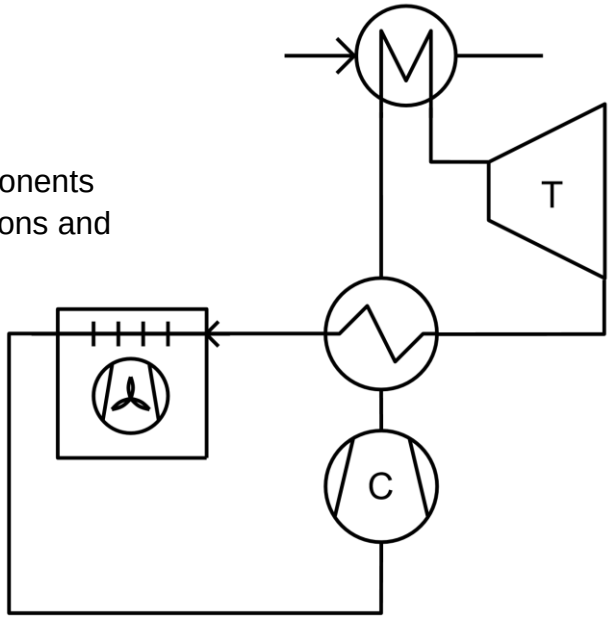

Figure 1: Recuperated sCO_2 cycle

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