

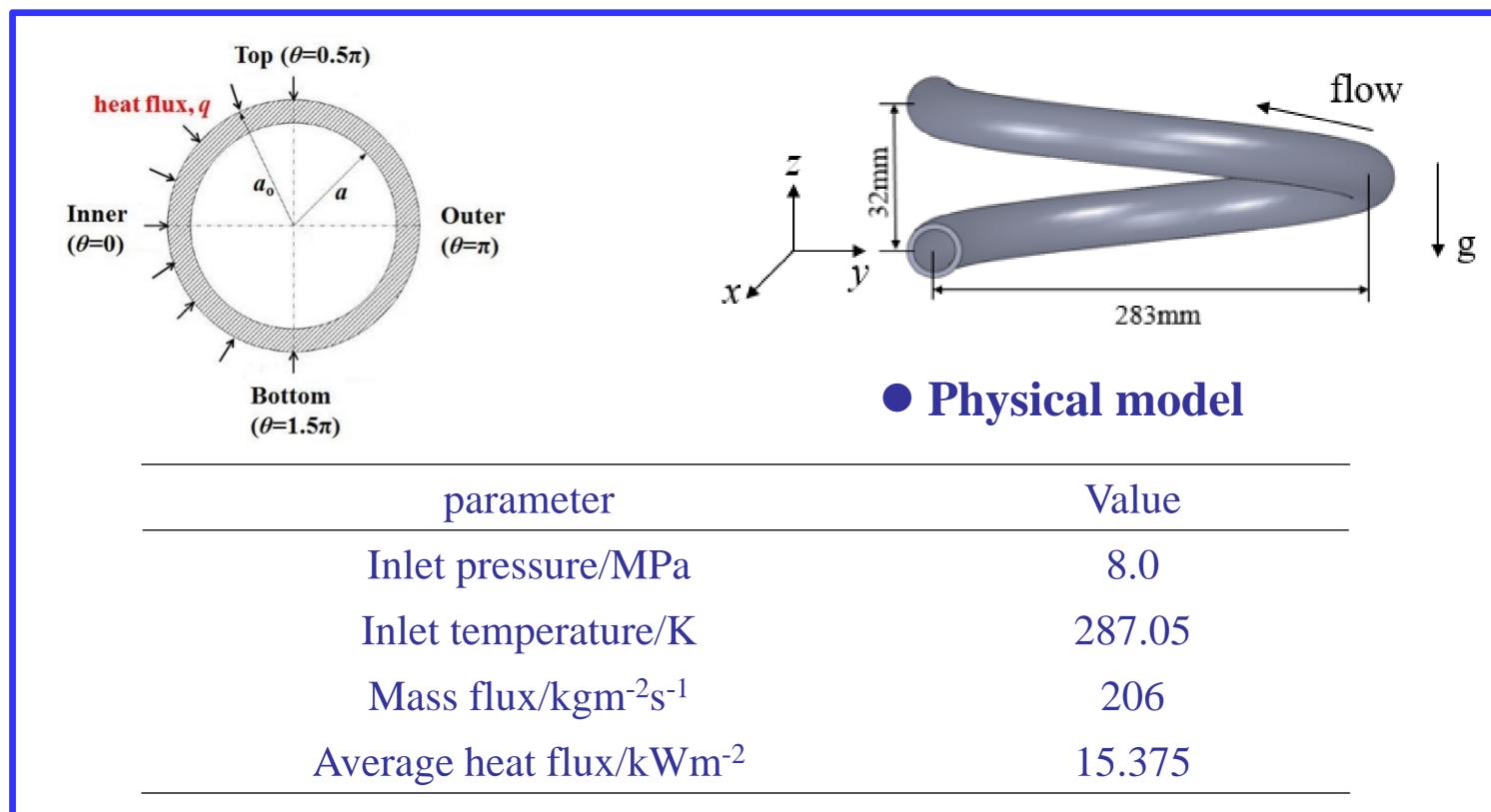
Study of flow and heat transfer of CO₂ at supercritical pressure

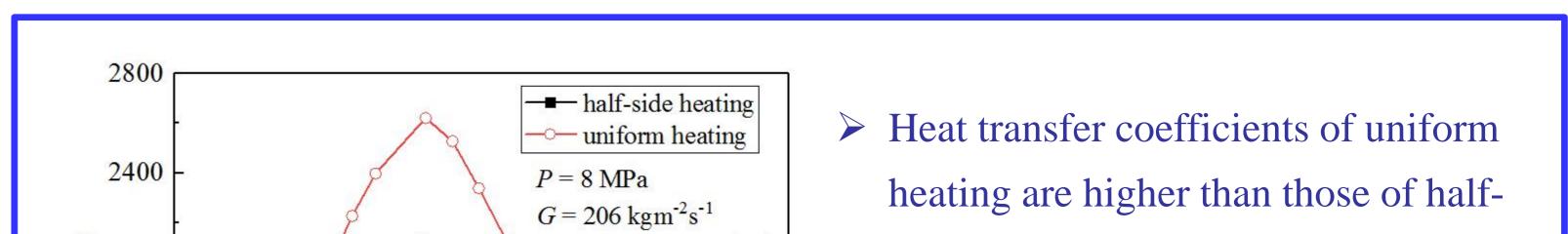


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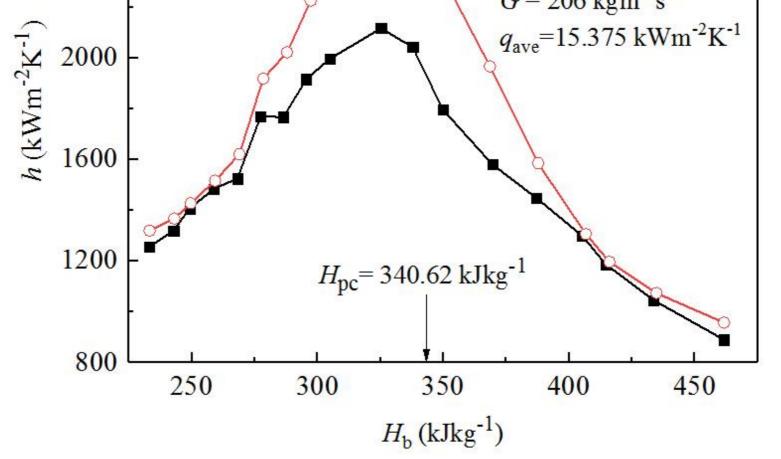
Introduction

- \succ Supercritical CO₂ is a promising working medium in the new type of power cycles and refrigeration systems;
- This paper presents our work on the flow and heat transfer of supercritical CO_2 , and a new type of ultra-compact plate heat exchanger (UCPHE) which is used as the regenerator in the supercritical CO_2 Brayton Cycle.
- **Study of flow and heat transfer of supercritical CO₂ in the helically-coiled tube under half-side heating**
 - Numerical model and parameters





Heat transfer performances under half-side heating condition

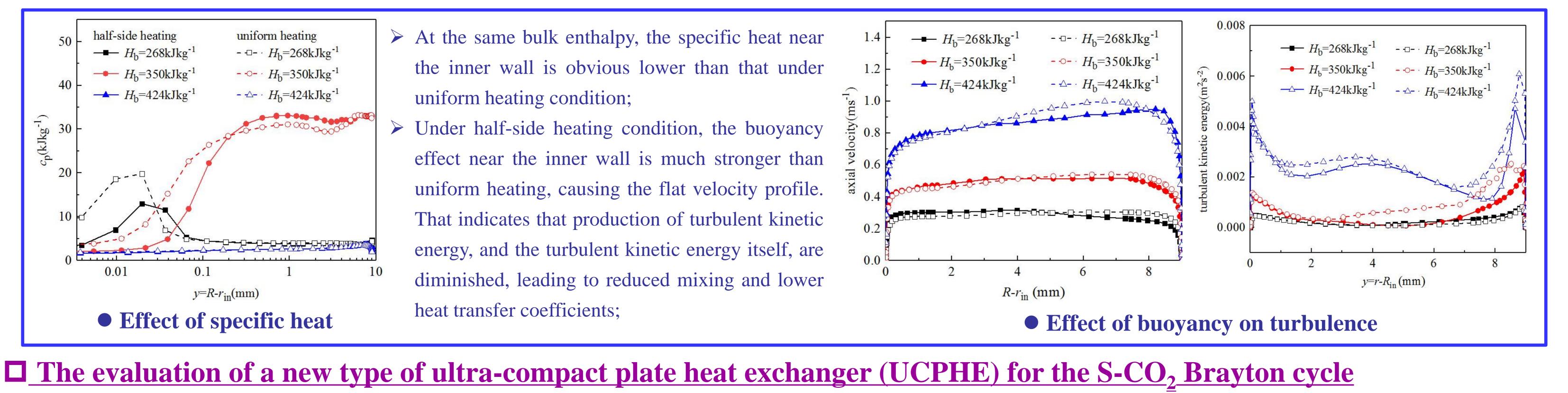


side heating condition;

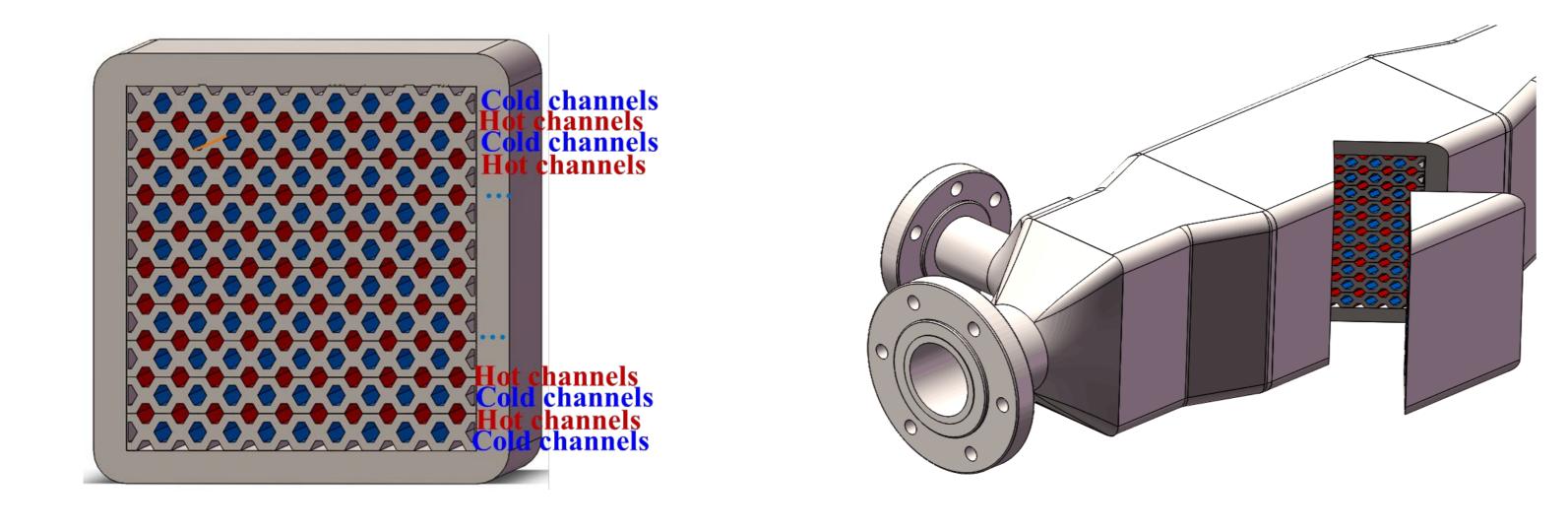
The discrepancy of HTC under
 different heating conditions reaches
 the peak at the pseudo-critical
 enthalpy.

• Heat transfer coefficients under uniform heating and inner half-side heating conditions

Nechanism on heat transfer of supercritical CO₂ in the helically-coiled tube under half-side heating



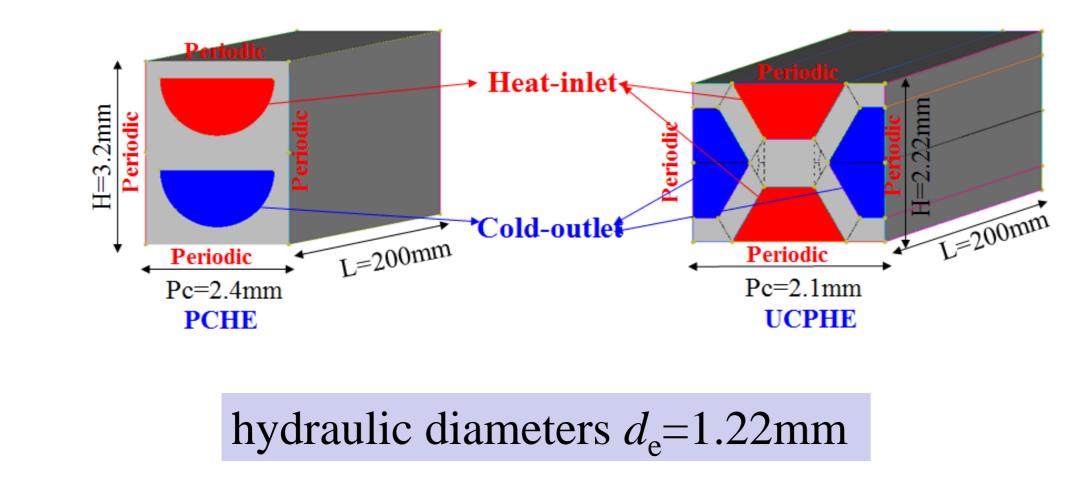
The structure of UCPHE



We proposed a new type of ultra-compact plate heat exchanger (UCPHE) as a candidate of the regenerator for the supercritical CO₂ Brayton cycle.

• The sketch of UCPHE

The numerical analysis on the thermal-hydraulic performances of UCPHE



• Heat transfer and flow resistance of UCPHE and the comparison with PCHE

- In the present work, the heat transfer and flow resistance performances of UCPHE with straight channels are analyzed and compared with PCHE using Fluent 14.0, the steady shear stress transport (SST) k-ω model is opted for modeling turbulent flow.
- > the Nusselt numbers and friction factors of UCPHE are extremely close to those of PCHE under the same hydraulic diameter and Reynolds number.

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