

SEMS: RESEARCH PROJECT DESCRIPTION

1. Project Background and Description

A project title and description with clear aims (300 words)

Project title: Experimental and theoretical investigation of condensation and flow boiling of green refrigerants in microchannels

To achieve the ambitious target of net-zero emissions of greenhouse gases in the UK by 2050, our residential heating systems must be significantly decarbonised. Coupling heat pumps and a renewable electricity supply network will be a key initiative. Recently advanced technologies have made evaporators and condensers compact and highly efficient as well as significantly reduced refrigerant inventory, allowing the use of next generation green refrigerants such as R32 (A2L) and R290 (A3) in heat pumps. The proposed project will experimentally investigate the flow boiling and condensation of these green refrigerants in microchannels.

2. Project Scope

Three research project objectives

The objectives of the proposed project are:

- (1) to conduct measurements using the existing test rig and the novel inverse method to obtain accurate local heat transfer and pressure drop data during flow boiling and condensation of green refrigerants in microchannels;
- (2) to study flow patterns during flow boiling and condensation in microchannels by visual observation using the optical method.
- (3) to develop the prediction methods for heat transfer and pressure drop based on the experimental data for design and optimisation of evaporators and condensers for heat pumps.

3. Desired Skills from the Student

Key skills needed for the PhD project

Academic background in thermofluids engineering or energy and power engineering is essential. Research experience in experimental or numerical heat transfer is desired.

4. Supervisory Team

Add supervisory team details

Primary: (Name (inc title). Prof. Huasheng Wang

Secondary: (Name (inc title)/ department or company if outside SEMS). Dr Lei Su

Additional: (Name (inc title)/ department or company if outside SEMS).