Design of a cryogenic test platform for CICC cooled by superfluid helium forced flow

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Introduction

- To explore the properties of using superfluid helium-cooled Cable In Conduit Conductor (CICC), The Comprehensive Research Facility for Fusion Technology Program (CRAFT) plans to build a test platform for CICC cooled by superfluid helium forced flow.

Acquisition of superfluid helium

- The process for acquiring superfluid helium in the cryogenic test platform is shown in **Fig. A**.
- Superfluid helium is obtained by combining **throttling** with **decompressing** 4.2 K liquid helium.
- In order to improve the efficiency of obtaining superfluid helium, a **sub-atmospheric heat exchanger** is arranged in the test platform to recover the cold from the negative-pressure helium.

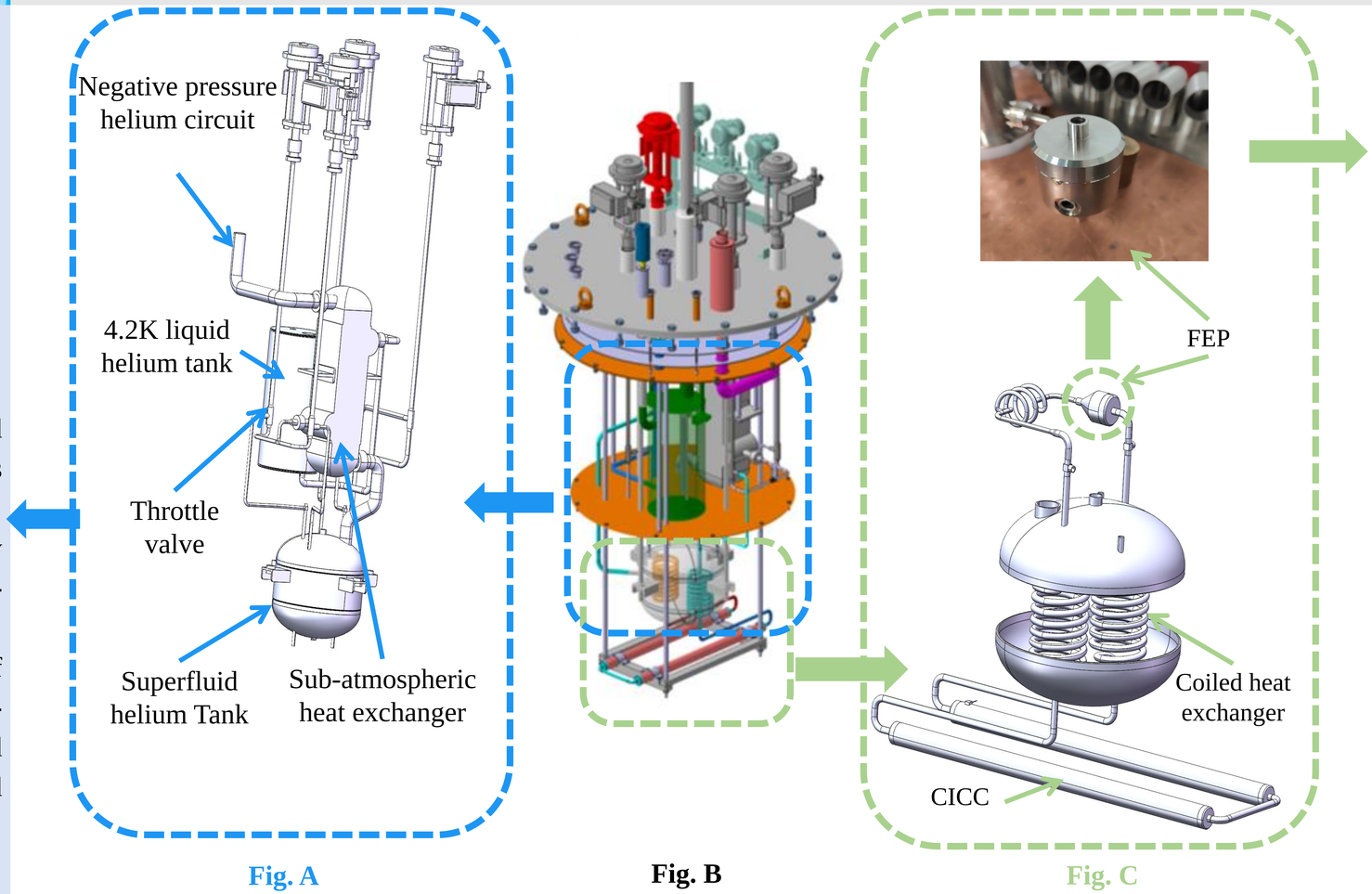
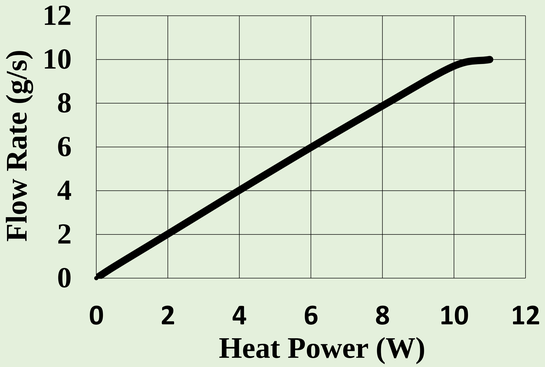


Fig. A **Fig. B** **Fig. C**

- The overall schematic of the cryogenic test platform is shown in **Fig. B**.
- The cryogenic test platform is composed of two main parts: the superfluid helium acquisition loop shown in **Fig. A** and the superfluid helium test loop shown in **Fig. C**.

Superfluid helium-cooled CICC test loop

- The process for the superfluid helium-cooled CICC Test Loop in the cryogenic test platform is shown in **Fig. C**.
- In order to realise the flow of superfluid helium in the loop, a **Fountain Effect Pump** (FEP) is installed in the test loop. The theoretical calculation parameters of the FEP are shown in the figure below.



Conclusion

- The mechanical structure design and machining of the test platform has been completed. Relevant experimental research will be carried out subsequently.