



MT 26
International Conference
on Magnet Technology
Vancouver, Canada | 2019

Contribution ID: 1070

Type: **Poster Presentation**

Mon-Af-Po1.18-09 [66]: A pressure drop model for helium flow in Cable-in-Conduit conductors based on porous media analogy

Monday 23 September 2019 14:30 (2 hours)

The pressure drop in Cable-in-Conduit Conductors cooled by a flow of liquid or supercritical helium is one of the key parameters for the design of the large superconducting magnet systems, which determines the heat removal capability and the thermal stability. In this paper, a new model for predicting pressure drop in Cable-in-Conduit conductors is derived based on an analogy between the bundle of strands in the cable and a porous medium. The new prediction model indicate that the pressure drop in Cable-in-Conduit conductors is affected by the structure of cable and the physical properties of the liquid, such as void fraction, tortuosity, hydraulic diameter, density and viscosity of liquid helium. In order to verify the validity of the pressure drop model developed in this paper, the predictions are compared with the experimental data, the results show that the predictions are in good agreement with the experimental data, this verifies the validity of the present pressure drop model for Cable-in-Conduit conductors. In addition, the effects of the cable structure parameters on pressure drop are simulated, which explains why the Katheder correlation can be used to predict the pressure drop of Cable-in-Conduit conductors at large Reynolds numbers.

Authors: MA, Zhicai (Lanzhou University); Prof. GAO, Yuanwen (Lanzhou University)

Presenter: MA, Zhicai (Lanzhou University)

Session Classification: Mon-Af-Po1.18 - Fusion IV: Thermohydraulics, Mechanical, and AC Losses