



## Fluid Dynamics in Parallel Helical Pipes

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### Abstract

Single phase and air-water two-phase flow in 12 mm inner diameter parallel helical pipes are investigated with three different coils diameters. Flow rate distribution, pressure drops and void fraction, along the pipes in the parallel channels are measured. The test pressure drops are compared with theoretical ones, in terms of friction factors and two phase multipliers. The instabilities arisen during the experimental tests are investigated and are related to the void fraction and flow quality. The void fraction values corresponding to the onset of oscillations are compared with a modified RELAP5/MOD3.3 code results at the same fluid dynamic conditions. Then the density wave, the flow pattern and parallel channel oscillations in some simple cases like a single vertical heated channel and in parallel channels, have been predicted by RELAP5/MOD3.3, to investigate the code ability to predict instabilities and to get instability maps for such cases; in particular the stability of the helical steam generators designed for Small Modular Reactors is investigated.

**Keywords:** Helical pipes; Pressure drops; Two phase flow; Fluid dynamic instability; RELAP5/MOD3.3 code

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