

Thermohydraulic Study of a Fixed Bed for the Core of a Nuclear Reactor

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Introduction: The fixed beds have the advantage of large heat transfer area, for they are used in some designs of innovative nuclear reactors as the reactor FBNR. Inside of study of fixed beds is important to define the following parameters: flow minimum and velocity profile of cooling fluid, temperature profile of cooling fluid and the fuel elements.

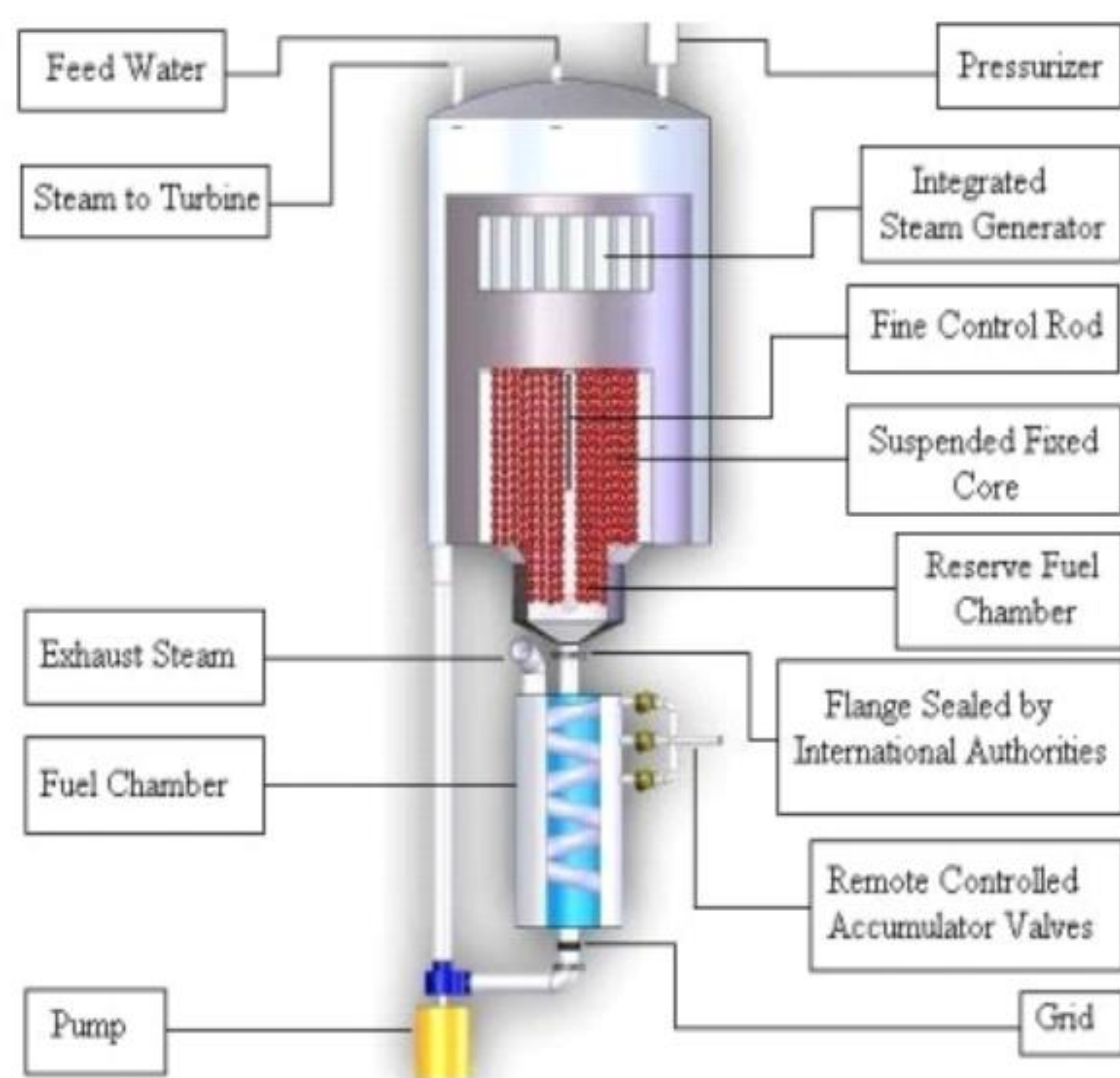


Figure 1. Schematic Design of FBNR [1]

Computational Methods: In this study was considered to nuclear fuel spheres (CERMET) as heat sources, the cooling fluid used in the simulation was water and the type of study was stationary. Arrangements analyzed for configuration of the spheres were BCC and FCC.

Results:

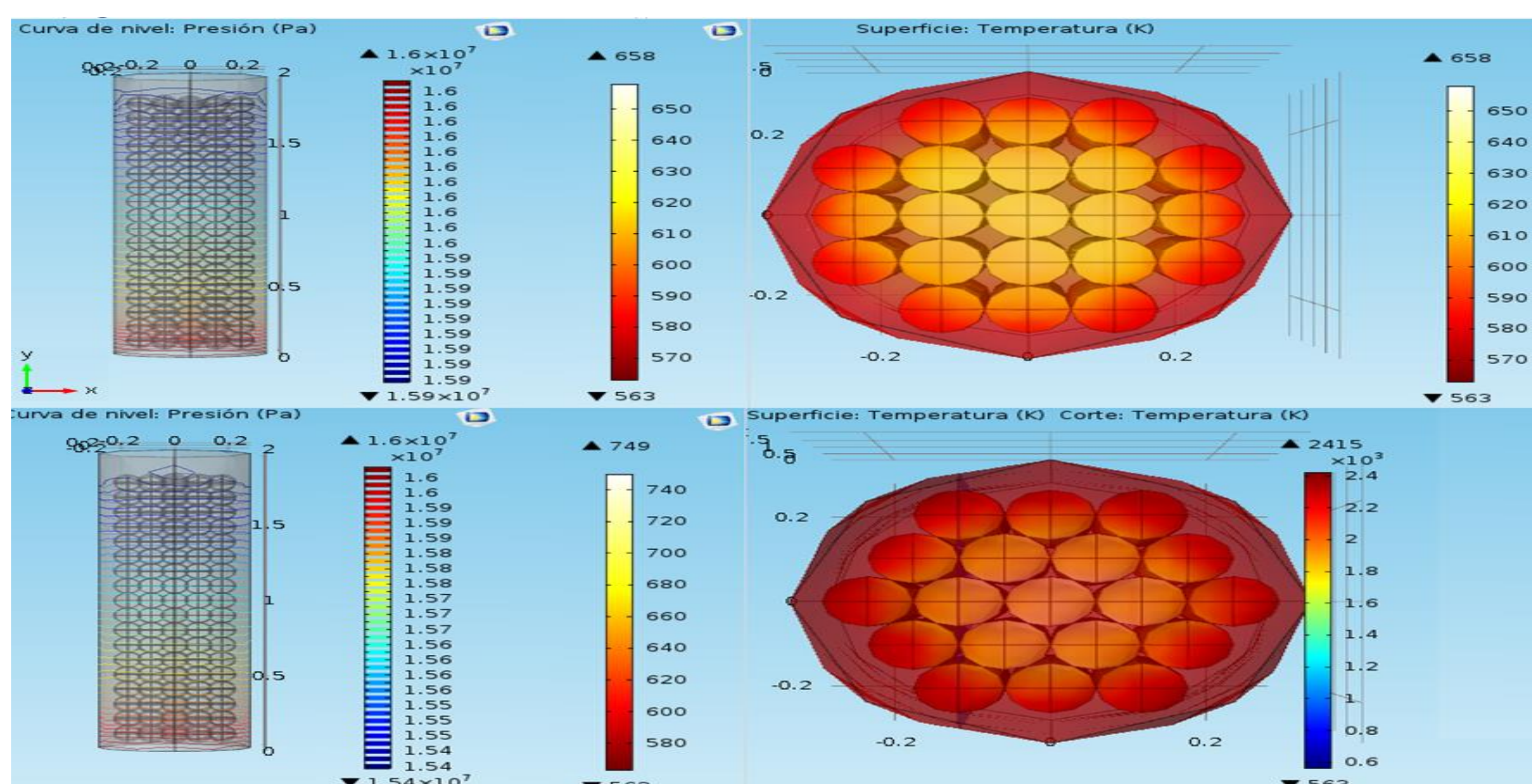


Figure 2. Title of the figure

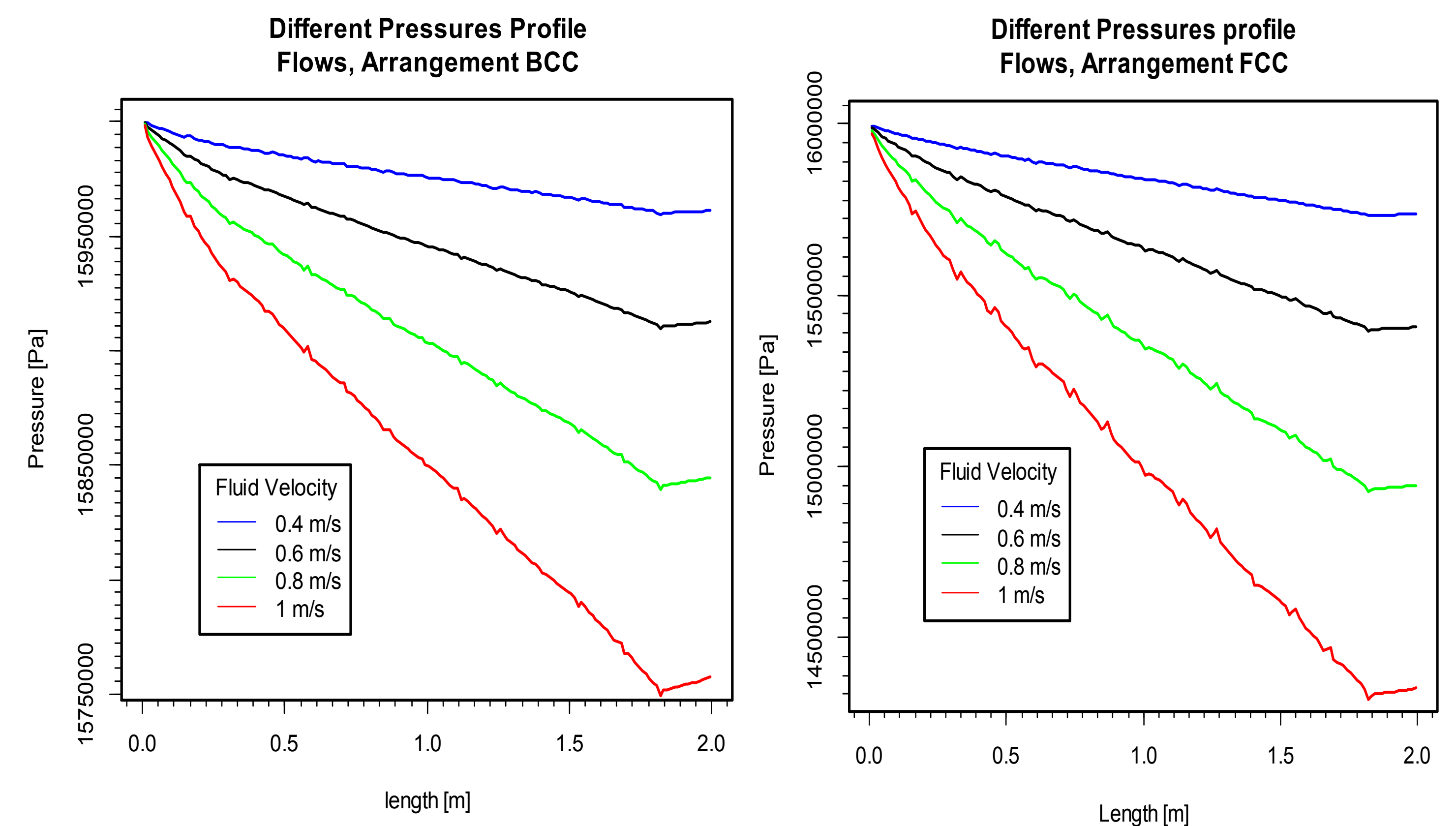


Figure 3 . Pressure in BCC and FCC configurations

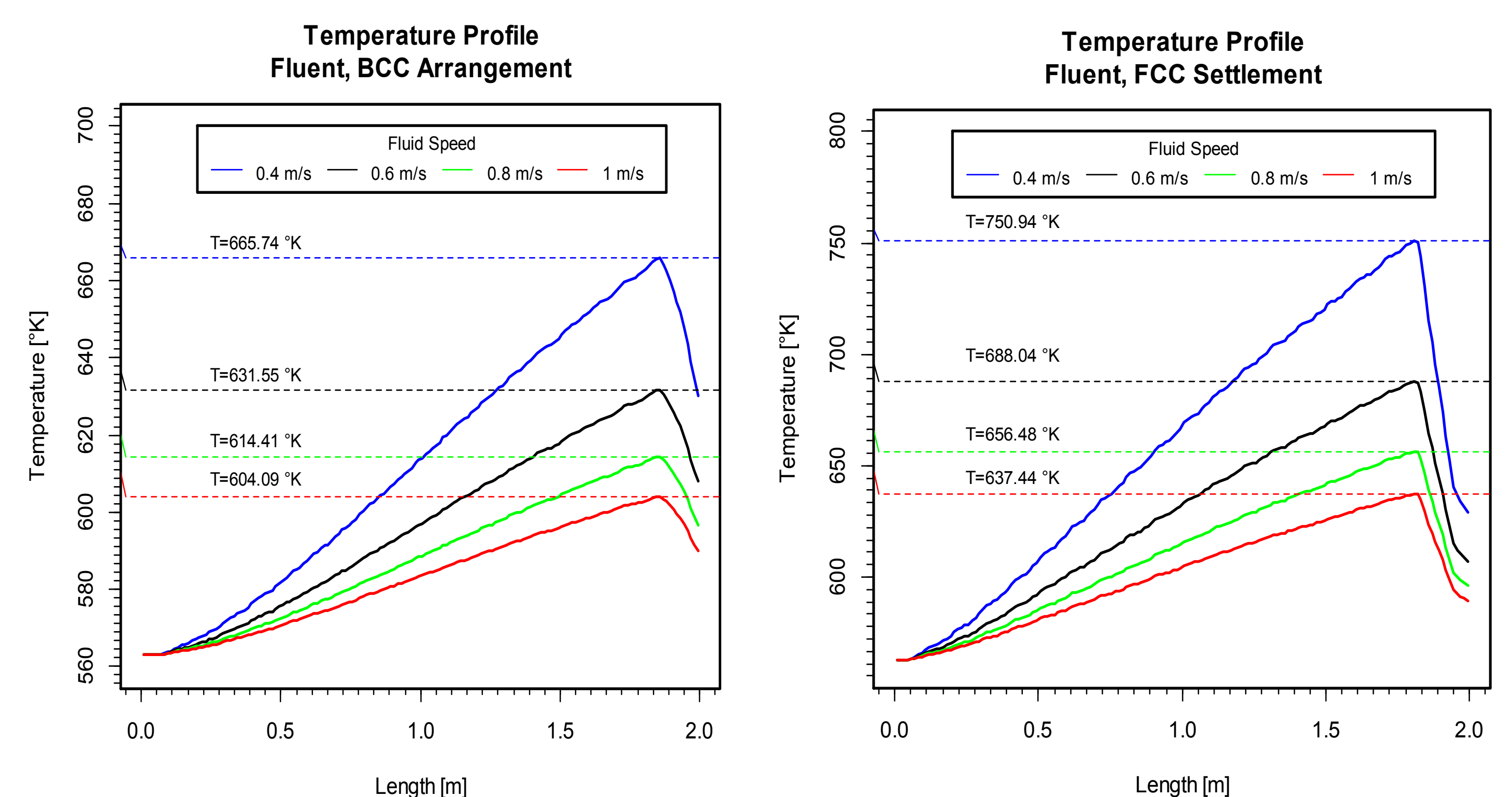


Figure 4 . Temperature profile of cooling fluid BCC and FCC configurations

Conclusions:

The results demonstrate the efficiency of BCC configuration in regard to heat transfer in the fixed bed [2], the data will be used to neutronic study of FBNR reactor, which can be performed with other modules of COMSOL multiphysic[®] offers

References:

1. Sefidvash F. Conceptual design of the fixed bed nuclear reactor (FBNR) Concept, *IAEA Report*, 123-125, (2005)
2. Achenbach E, Heat and Flow Characteristics of packed beds, *Experimental thermal and fluid science*, 17-25 (1995)