Summary:

Experimental and numerical simulation studies of a three-dimensional turbulent flow of water in a coaxial exchanger are presented. The heat exchanger was divided into three equal sections to allow examination of the intermediate stream temperatures using thermocouples that capture the current temperatures of the four stations and the wall temperatures in the inlet and Release. Exchanger water / water heat turbulent flow. H 951 was designed to obtain quantitative results on the coefficients of heat transfer surface and global exchanger concentric tubes in turbulent flow. This compact unit designed to be installed on a table establishes, inter alia, the relationship between the Nusselt number, Reynolds and Prandtl, and the comparison of results in parallel flow or against the current. The second part of the study was done by numerical simulation; we tested the mathematical model $k-\varepsilon$ using finite volume in healthy fluent software. This work contributes greatly to the understanding of turbulent flows in a coaxial heat exchanger, and also shows the effect of physical parameters (temperature, diameter, flow rate) on the establishment of the turbulent flow in a coaxial heat exchanger.

The results obtained in this dynamics study of water in turbulent flow by the experimental and numerical study components are in good agreement and correspond to the results given in the literature (J.castaing-Lasvignottes). It has been found that the turbulent compact coaxial exchanger has a good configuration as it gives significant power exchange for surfaces too small. Flow phenomena of interest were observed. One can quote for example: The effect of various parameters (temperature, speed, and diameter) on the establishment of turbulent flow, the effect of the turbulence in the flow and in particular the behavior of the axial and tangential velocity fluctuations in this configuration exchanger has been shown numerically.

Keywords: coaxial exchanger, fluent, turbulence models, three-dimensional flow, turbulence, heat transfer.