

In this paper, a theoretical study of laminar forced convection inside ducts, subjected to periodically varying inlet temperature is presented. A thermal diffusion in the duct walls and a boundary condition which accounts for external convection are considered. In the first part, this problem is solved by applying a Generalized Integral Transform Technique (GITT). The complex eigenvalues and coefficients results are listed and compared with the literature. In the second part, the Quasi-steady Approach (QSA) which employs a constant heat transfer coefficient at liquid–solid interface is also investigated and compared with the GITT solution. The bulk temperature, Nusselt number, the damping and phase lag coefficients as function of the inlet temperature frequency are plotted