**Abstract**

The subject of heat transfer enhancement has significant interest to develop the compact heat exchangers in order to obtain a high efficiency, low cost, light weight, and size as small as possible. Therefore, energy cost and environmental considerations are going on to encourage attempts to invent better performance over the existence designs. Streamwise vortices can be generated using small flow manipulators or protrusions such as wings and winglets configurations. Single-pair, single row, or two dimensional array of vortex generators (VGs) can be punched, mounted, attached or embedded in the boundary layer of flow channel. VGs generate longitudinal and transverse vortices, while longitudinal vortices are more efficient for heat transfer enhancement than transverse vortices. A dramatic augmentation in thermal performance of the thermal system can be achieved but pressure drop penalty is existed. Several parameters have been overviewed in this paper, which have pronounced effect on the convective heat transfer coefficient and pressure drop penalty. These parameters are: attack angle of VG, geometry of VG, standard and novel types of VG, spacing between the VG tips, number of pairs of VGs in the flow direction, rectangular or circular array arrangement of VGs, common-flow upper (CFU) or common-flow down (CFD) configuration of VG, pointing up (PU) or pointing down (PD) arrangement of VG with flow direction, Re number, channel aspect ratio, number of tubes of fin-tube heat exchanges (HE), circular or oval tubes of fin-tube HE, and location of VG respect to the tube of HE or from leading edge of the channel. This paper gives an overview about the early studies done in order to improve the performance of thermal systems with minimal pressure losses to derive systems with less negative impact on the environment and high level of energy economic. This study also provides an outlook for future work using nanofluids with vortex generators.

This article is also summarizes the recent experimental and numerical developments on the thermal conductivity measurements of nanofluids, thermal conductivity enhancement, convection and conduction heat transfer, some applications, main problems and suggestions for future works.