



## IMPROVEMENT OF MIXING AND HEAT TRANSFER CHARACTERISTICS OF LAMINAR FLOWS BY CORRUGATED PLATES WITH AN EGG CARTON CONFIGURATION

S.M.Hosseinalipour, P.R.Mashaei † and P.Taheri††

Associate Professor, Iran University of Science & Technology/ Computer Aided Engineering Lab;  
Alipour@iust.ac.ir

† M.Sc Student, Iran University of Science & Technology/ Computer Aided Engineering Lab;

P\_R\_Mashai@Mecheng.iust.ac.ir

††M.Sc Student, Iran University of Science & Technology/ Computer Aided Engineering Lab;

payamtaheri@Mecheng.iust.ac.ir

**Abstract.** *A numerical analysis about mixing and heat transfer in a channel formed between two corrugated plates with an egg carton configuration was presented. The numerical simulation was performed for Reynolds number ( $Re$ ) ranging from 100-900. In order to evaluate mixing and heat transfer performance, lyapunov exponent ( $\lambda$ ) and Nusselt number ( $Nu$ ) were calculated respectively and the comparisons were carried out between the chaotic channel and simple channel with same length and surface. The results have shown the value of lyapunov exponent is between 0.05-0.2. The positive lyapunove exponent showed the channel with egg carton configuration is chaotic. This study has also showed the chaotic configuration has Nusselt number 2.55to7.4 times with corresponding friction factor 200to32400 times of that in simple channel. In additional, we presented the hydraulic-thermal performance ( $\eta$ ) that decreases with Reynolds number augmentation.*

**Key words:** Heat transfer, Mixing, Nusselt number, Chaotic advection