INSPEM WEEKLY SEMINAR

13/2018

Date & Time

6th April 2018, Friday @ 3.15 pm

Venue

Al-Farabi Seminar Room, Second Floor, INSPEM

Presenter

Dr. Nadihah Wahi
Lecturer
Department of Mathematics, Faculty Science, UPM

Topic

Artificial Dissipation in Euler Equations

Abstract

The perturbation analysis in an effort to find the possible culprit in the numerical instability solutions from the Euler equations show that several factors may contribute to the problem. One of the factors that consistently exist in 1D and 2D cases is the fluctuation in density. Following the results, we firstly start to add artificial diffusion in 1D case where density is assume to diffuse of second order and evaluated using central scheme. Three schemes were tested and they are Roe's flux, AUSM-up and Entropy-Conserving (EC). All three schemes have shown positive feedback to the artificial diffusion. Then, a similar diffusion is added to the 2D case and the results are also positive. Despite the fact that good results were achieved, the artificial diffusion is far from the physical applicability such that when density is assumed to diffuse across the shock, which properties that actually diffused were unclear. In other words, either the diffusion is from volume or mass at which the latter will be physically unacceptable since mass is a conserve extensive property. Hence, this lecture will discuss the idea of volume diffusion in fluid flow as an extension to the artificial diffusion to solve the shock instability (or anomaly) so that the addition is physically acceptable.