[JJ] Evening Poster | P (Space and Planetary Sciences) | P-EM Solar-Terrestrial Sciences, Space Electromagnetism & Space Environment

[P-EM17]Space Plasma Physics: Theory and Simulation

convener:Takayuki Umeda(Institute for Space-Earth Environmental Research, Nagoya University), Yohei Miyake(Education Center on Computational Science and Engineering, Kobe University), Yasuhiro Nariyuki(富山大学人間発達科学部, 共同), Tadas Nakamura(Fukui Prefectural University)
Wed. May 23, 2018 5:15 PM - 6:30 PM Poster Hall (International Exhibition Hall7, Makuhari Messe)
This session focuses on studies of space plasma physics via theoretical and numerical approaches. Papers on a wide variety of topics from natural phenomena to artificial plasma environment as well as theoretical and computational methodologies are welcome.

[PEM17-P03]Parameter tuning of a 5th order conservative and non-oscillatory scheme with super Gaussian distributions

*Naru Tsujine[1], Takayuki Umeda[2], Yasuhiro Nariyuki[1], Takayuki Haruki[1] (1.University of Toyama, 2.Nagoya University)
Keywords:Advection equation, Vlasov simulation

Limiter functions used in the conservative and non-oscillatory scheme preserves the mass conservation and fulfills the non-oscillatory and positivity of plasma distribution functions with less computational cost for Vlasov simulations. The limiter functions have free parameters that control the gradient of the plasma distribution functions for numerical fluxes. The aim of this study is to optimize these parameters in order to achieve higher-accuracy without numerical oscillation and diffusion.
In previous study, we discussed the characteristics of two free parameters for tuning a 5th order conservative and non-oscillatory scheme with Gaussian distributions. The values of these parameters should be chosen to minimize the error between analytical and numerical fluxes. We found that the gradients in limiter functions are modified in the tail and not modified in the top and inflection point of the Gaussian distribution. The relational expression between these parameters was obtained in the tail.
In this study, we introduced super Gaussian distributions for changing the gradient in Gaussian distributions. The characteristics of the gradients are almost same as the previous results in the tail and inflection point. However, the gradients are modified in the top of super Gaussian distributions. We will optimize these parameters in limiter functions.