HIGHER ORDER NON-LINEAR DUST ION ACOUSTIC (DIA) SOLITARY WAVES IN PLASMAS WITH WEAK RELATIVISTIC EFFECTS IN ELECTRONS AND IONS

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Abstract. In this new investigation of higher order non-linear dust-ion acoustic (DIA) waves with negative dust charges and weakly relativistic ions and electrons in the plasma, only compressive DIA solitons of interesting characters are established through the modified Korteweg-de Vries (mKdV) equation which is derived through standard perturbation technique. It is found that the amplitude of the solitons increases for smaller streaming speed to ions and electrons with the increment of dust to ion density ratio, whereas it is opposite for higher streaming speed of ions and electrons. It is also found that the amplitude of the compressive solitons remains unaffected and linearly increases with the enhancement of dust charges in the plasma. Finally, application of this study to astrophysical and space plasma are discussed briefly.

References

Kalita, B.C., Das, S. : 2014, *Astrophysics and Space Science*, **352**(2), 585.
Mamun, A. A., Cairns, R. A., & Shukla, P. K. : 1996, *Physics of Plasmas*, **3**(7), 2610.
Mamun, A. A., Mannan, A. : 2021, *Waves in Random and Complex Media*, 1-12.
Kalita, B. C., Bhattacharjee, D. : 2020, *Plasma Physics Reports*, **46**(10), 1004.
Kalita, B.C., Das, S. : 2017, *Journal of Plasma Physics*, **83**(5), 905830502.