



AAPPS-DPP 2018 Plenary speaker Name: Prof. A.A. Mamun

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Rationale: Prof. Mamun has made a substantial contribution towards the published literature of theoretical plasma physics. He has published over 400 research articles in peer-reviewed international journals. Prof. Mamun worked with PK Shukla and has made crucial contributions to advancing the new research field of dusty or complex plasma physics. His book co-authored with P.K. Shukla has 2163 Google cites. Total Google citation is 11400 with H-index=47. http://people.juniv.edu/profile/mamun_phys. His talk on Solitary and Shock Waves in Dusty Plasmas will be a good opportunity for our community

Talk Title: Solitary and Shock Waves in Dusty Plasmas, and some open issues

Short abstract: Two commonly used dusty plasma models (viz. plasma with stationary charged dust and plasma with mobile charged dust) are considered. The basic features of solitary [1,2] and shock [3,4] waves associated with both dust-ion-acoustic (DIA) waves (which arise due to the compression and rarefaction of inertial ions in presence of inertialess electrons and stationary charged dust) and dust-acoustic (DA) waves (which arise due to compression and rarefaction of charged dust in presence inertialess electrons and ions) are identified. It is observed that i) the dusty plasma system with stationary charged dust supports the DIA solitary and shock waves with positive or negative electrostatic potential depending on the amount of stationary charged dust present; ii) the dust charge fluctuation acts as a new source of dissipation, and is responsible for the formation of the DIA shock structures; iii) the dusty plasma system with mobile charged dust supports the DA solitary waves with negative electrostatic potential only; iv) the strong correlation among the highly charged dust is an alternative source of dissipation, and is responsible for the formation of the DA shock structures. The implications of these results in some laboratory experimental observations [5,6,7,8] and some open issues in identifying the properties of the DIA and DA solitary waves are pinpointed.

List of related published papers

1. A. Mamun and P. K. Shukla, *Phys. Plasmas* **9**, 1468 (2002).
2. A. A. Mamun and P. K. Shukla, *IEEE Trans. Plasma Sci.* **30**, 720 (2002).
3. A. A. Mamun, *Astrophys. Space Sci.* **268**, 443 (1999).
4. A. A. Mamun and R. A. Cairns, *Phys. Rev. E* **9**, 055401(R) (2009).
5. Y. Nakamura and A. Sharma, *Phys. Plasmas* **8**, 3921 (2001).
6. Y. Nakamura, H. Bailung and P. K. Shukla, *Phys. Rev. Lett.* **83**, 1602 (1999).
7. P. Bandyopadhyay *et al.*, *Phys. Rev. Lett.* **101**, 065006 (2008).
8. J. Heinrich, S. H. Kim and R. Merlino, *Phys. Rev. Lett.* **103**, 115002 (2009).



Prof. Mamun with the Crown Prince of Japan in International Youth Village Program-1989