



Analytic and Simulation studies of nonplanar low frequency waves in dusty plasma

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We investigate the nonlinear wave propagation in warm dusty plasmas with variable dust charge, ions at two different temperatures and nonthermal electron. The Zakharov-Kuznetsov (ZK) equation is obtained using reductive perturbation technique. The linear dispersion characteristics are studied and the energy and profile expressions of nonlinear solitary structures are calculated. Variable dust charge has an effect on the energy of a soliton and the angular frequency of a linear wave, which are also studied. It is observed that the energy increases with non-thermal parameter. Our investigations can be useful in understanding the behavior of dust acoustic waves (DAWs) in space, astrophysical and semiconductor plasma environments. Related works of our various simulation methods can be found in our recent works. The simulation techniques employed are the homotopy aided symbolic simulation (HASS) and the INSAT FORK Code. Both these techniques have been designed at the computation facility of Institute of Natural Sciences and Applied Technology, Kolkata. The HASS technique gives a real time frozen picture of field quantities and the streamline diagrams the FORK code gets a picture during the evolution of stationary structures and interactions between waves.

- [1] Goswami, Jyotirmoy; Chandra, Swarniv; Sarkar, Jit; Ghosh, Basudev; ;Pramana-Journal of Physics;95, 54;2021
- [2] Das, Chinmay; Chandra, Swarniv; Ghosh, Basudev; ;Pramana-Journal of Physics;95,2;2021
- [3] Ghosh, Amit; Goswami, Jyotirmoy; Chandra, Swarniv; Das, Chinmay; Arya, Yash; Chhibber, Hema; ;IEEE Transactions on Plasma Science;10.1109/TPS.2021.3109297;2021
- [4] Ballav, Swastik; Das, Ansuman; Pramanick, Suman; Chandra, Swarniv; ;IEEE Transactions on Plasma Science;10.1109/TPS.2021.3112178;2021
- [5] Das, Arnab; Ghosh, Payel; Chandra, Swarniv; Raj, Vishal; ;IEEE Transactions on Plasma Science;DOI: 10.1109/TPS.2021.3113727;2021
- [6] Sahoo, Himangshu; Das, Chinmay; Chandra, Swarniv; Ghosh, Basudev; Mondal, Kalyan Kumar; ;IEEE Transactions on Plasma Science;DOI: 10.1109/TPS.2021.3120077;2021
- [7] Thakur, Souradeep; Das, Chinmay; Chandra, Swarniv; ;IEEE Transactions on Plasma Science;10.1109/TPS.2021.3133082;2021
- [8] Chandra, Swarniv; Goswami, Jyotirmoy;

Sarkar, Jit; Das, Chinmay; Ghosh, Basudev; Nandi, Debapriya; ;Indian Journal of Physics;10.1007/s12648-021-02276-x;2021

- [9] Dey, Ankur; Chandra, Swarniv; Das, Chinmay; Mandal, Surajit; Das, Trisita; ;IEEE Transactions on Plasma Science;10.1109/TPS.2022.3143001;2022
- [10] Sarkar, Jit; Chandra, Swarniv; Dey, Ankita; Das, Chinmay; Marick, Aritra; Chatterjee, Prasanta; ;IEEE Transactions on Plasma Science;10.1109/TPS.2022.3140318;2021
- [11] Sarkar, Soumya; Dey, Anuradha; Pramanick, Suman; Ghosh, Tamal; Das, Chinmay; Chandra, Swarniv; ;IEEE Transactions on Plasma Science;10.1109/TPS.2022.3146441;2022
- [12] Kapoor, Sharry; Dutta, Debiprosad; Ghosh, Mittka; Chandra, Swarniv; ;IEEE Transactions on Plasma Science;10.1109/TPS.2022.3148183;2022
- [13] Shilpi; Sharry; Das, Chinmay; Chandra, Swarniv; ;Springer Proceedings in Complexity;;2022
- [14] Sarkar, Jit; Chandra, Swarniv; Goswami, Jyotirmoy; Ghosh, Basudev; ;Springer Proceedings in Complexity;;2022
- [15] Chandra, Swarniv; Banerjee, Rupanjan; Sarkar, Jit; Zaman, Soureen; Das, Chinmay; Samanta, Subha; Deeba, Farah; Dasgupta, Brahmananda; ;Journal of Astrophysics and Astronomy;;2022
- [16] Das, Chinmay; Chandra, Swarniv; Kapoor, Sharry; Chatterjee, Prasanta; ;IEEE Transactions on Plasma Science;10.1109/TPS.2022.3158965;2022
- [17] Chandra, Swarniv; Kapoor, Sharry; Nandi, Debapriya; Das, Chinmay; Bhattacharjee, Dayita; ;IEEE Transactions on Plasma Science;doi: 10.1109/TPS.2022.3166694.;2022
- [18] Manna, Gobinda; Dey, Suman; Goswami, Jyotirmoy; Chandra, Swarniv; Sarkar, Jit; Gupta, Amrita; ;IEEE Transactions on Plasma Science;10.1109/TPS.2022.3166685;2022