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Interaction between a soliton and a double layer in a traveling magnetic field system HARIHARA KUMAR, MASAYUKI TAKAHASHI, CHINAMI KATO, NAOFUMI OHNISHI, Tohoku University — The case of a magnetic pulse traveling through a plasma is studied theoretically. Double layer (DL) and solitons were observed in this system before and it's known that certain DLs decay by emitting solitons[1]. However, the exact trigger mechanism causing this DL-soliton transition is not understood yet. Theoretically, this transition can be treated as a DL-soliton interaction. The soliton and DL KdV equations for the traveling pulse case is derived using the Reductive Perturbation Method (RPM) by considering trapped and free electrons and free ions. RPM is used to reduce nonlinear PDEs using asymptotic expansions. This means the interaction term between the 1^{st} order soliton and the 2^{nd} order DL is usually lost and the system of equations is unclosed. In this study, the closure is achieved by assuming an ion density distribution in the DL and back-substituting the DL parameters into the soliton system as a higher order asymptote. The interaction term thus found is directly proportional to the trapped electron density. A higher trapped electron density means an increased DL-soliton interaction and a decreased chance of DL decay. The interaction is also solitary in nature. [1]Ikezi H, Taylor R J and Baker D R, 1970, Formation and Interaction of Ion-Acoustic Solitons, Phy. Rev. Lett., 25, pp. 11 – 14.

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