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Phase conjugate reflection of electromagnetic waves from a plasma

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Phase Conjugate Reflection of Electromagnetic Waves From a Plasma*, D. TZACH, A. FISHER, N. ROSTOKER, G. BENFORD and E. GARATE, Department of Physics, University of California (at) Irvine, California 92717, I. NEBENZAHL, Racah Institute of Physics, Hebrew University, Jerusalem, Israel, and A. RON, Department of Physics, Technion, Haifa, Israel--We shall discuss the possibility of using a plasma, as the nonlinear medium, for generating phase conjugate reflection of electromagnetic waves in the microwave region, by almost degenerate four wave mixing. The reflected beam can be significantly amplified by the plasma.

We show that the phase conjugate reflection is of significant magnitude if the frequency and the wave vector difference of the signal wave, with respect to the pump waves, resonate with the frequency and the wave vector of the ion acoustic mode of the plasma.

The main results of the theory developed are described, as well as the experiment we have initiated to verify the phase conjugation. Possible applications of the emergent technology are discussed, as well as results of preliminary experiments like the excitation of ion acoustic waves and investigation of the plasma properties.

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