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**Refraction of intense laser light with relativistic self-focusing in preformed plasma** HIDEAKI HABARA, Graduate School of Engineering, Osaka University, K. ADUMI, T. YABUUCHI, T. TANIMOTO, J. SUZUKI, T. MATSUOKA, ILE, K. KONDO, R. KODAMA, K. TANAKA, Graduate School of Engineering, Osaka University — We have studied propagation of an intense laser light in the preformed plasma. When the laser intensity is high enough, it is expected to change the laser propagation direction from the specular due to relativistic and nonlinear effect of laser light such as relativistic self-focusing. The experiments were performed using GMII 20TW laser system at ILE, Osaka Univ. The intense laser irradiate in the preformed plasma with 60 deg. incidence from the target normal. The incident and reflected light was observed by measuring the spatial distribution of accelerated fast electrons with a stack of imaging plates behind the side of the target. The size of IP is large enough to cover both incident and reflected directions. In the experiments, we observed two peaks on the imaging plate, each of which corresponds to the incident and reflected laser direction at the low energy shot. On the other hand, when the laser intensity increased, the peaks merge into one peak. It can be considered the reduction of the plasma refraction due to increase of gamma number by relativistic self-focusing. To evaluate the reflection angle, we performed a simple ray- trace calculation including relativistic self-focusing effect. The calculation indicates that the laser intensity increase about 8 times of the original laser intensity. The evolution of the refraction will be also discussed.

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