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In-plane optical response in underdoped YBCO TERUHISA KAKESHITA, SRL-ISTEC, TAKAHIKO MASUI*, SRL-ISTEC, SETSUKO TAJIMA*, SRL-ISTEC, SRL-ISTEC TEAM — The recent STM experiments demonstrated that the electronic state in CuO_2 plane is inhomogeneous [1], which becomes conspicuous in the underdoped regime. In such an inhomogeneous state, it is not obvious whether a superfluid density is correctly estimated by a conventional way. We investigated the in-plane optical response for underdoped YBCO crystal to discuss the relation between inhomogeneity and superfluid density in the pseudo-gapped state. The a-axis optical spectrum shows a larger residual conductivity than that for the optimum doping. The superfluid density estimated from our optical spectrum at the lowest temperature is substantially smaller than that determined by μSR. We discuss this strongly suppressed superfluid density and the large residual conductivity in terms of the inhomogeneity in real- and k-space. This work was supported by the New Energy and Industrial Technology Development Organization(NEDO) through ISTEC as the Collaborative Research and Development of Fundamental Technologies for Superconductivity Applications. [1]K.M.Lang et al., Nature 415, 412 (2002). *present address: Dept. of Physics, Osaka University, Machikaneyama 1-1, Toyonaka, Osaka 560-0043, Japan

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