X26a Super-Resolution with Subaru/HSC Data I: Major Merger Fractions of $L_{\rm UV} \sim 3-15\,L^*_{\rm UV}$ Dropout Galaxies at $z \sim 4-7$

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We perform a super-resolution analysis of the Subaru Hyper Suprime-Cam (HSC) images to estimate the major merger fractions of $z \sim 4-7$ dropout galaxies at the bright end of galaxy UV luminosity functions (LFs). Our super-resolution technique improves the spatial resolution of the ground -based HSC images, from $\sim 1''$ to $\lesssim 0.^{prime\prime}1$, which is comparable to that of the *Hubble Space Telescope*, allowing us to identify $z \sim 4-7$ bright major mergers at a high completeness value of $\gtrsim 90\%$. We apply the super-resolution technique to 6535 very bright dropout galaxies in a UV luminosity range of $L_{\rm UV} \sim 3-15\,L^*_{\rm UV}$ corresponding to $-24\ lesssim M_{\rm UV} \lesssim -22$. The major merger fractions are estimated to be $f_{\rm merger} \sim 5-20\%$ at $z \sim 4$ and $\sim 50-80\%$ at $z\ sim 5-7$, which shows no $f_{\rm merger}$ difference compared to those of a control faint galaxy sample. Based on the $f_{\rm merger}$ estimates, we verify contributions of source blending effects and major mergers to the bright-end of double power-law (DPL) shape of $z \sim 4-7$ galaxy UV LFs. While these two effects partly explain the DPL shape at $L_{\rm UV} \sim 3-10\,L^*_{\rm UV}$, the DPL shape cannot be explained at the very bright end of $L_{\rm UV} \gtrsim 10\,L^*_{\rm UV}$, even after the AGN contribution is subtracted. The results support scenarios in which other additional mechanisms, e.g., insignificant mass quenching effects, contribute to the DPL shape.