

Liquid crystal display (LCD) photocuring 3D Printing (LPP) is a fast and affordable method that utilizes LCD as a dynamic mask, but it suffers from light leakage and insufficient precision under high-power ultraviolet (UV) light irradiation, resulting in poor print quality. This paper proposes a local dimming (LD) method for LPP for the first time, which can locally adjust the brightness in the backlight array according to the shape of the digital mask, thereby suppressing LCD light leakage and improving edge quality. The influence of the process parameters, including exposure time, pixel compensation coefficient and the initial backlight calculation methods of the LD method on the printing quality is studied. Results show that, compared with the traditional backlight method (TB method) with a full backlight, after adopting LD method, the dimensional accuracy of the printed part can be improved up to 81.56%. This study proposes a local dimming method that significantly improves the inherent light leakage issue in LCDs, which allows for a significant improvement in system resolution, enabling it to print more intricate structures with greater precision.