Variability of Massive Stars with Known Spectral Types in the Small Magellanic Cloud Using 8 Years of OGLE-III Data

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We present a variability study of 4646 massive stars in the Small Magellanic Cloud (SMC) with known spectral types from the catalog of Bonanos et al. (2010) using the light curves from the OGLE-III database. The goal is to exploit the time domain information available through OGLE-III to gain insight into the processes that govern the evolution of massive stars. This variability survey of massive stars with known spectral types is larger than any previous survey by a factor of 7. We find that 60% of our sample (2766 stars) show no significant variability and 40% (1880 stars) exhibit variability distributed as follows: 807 stars display low-amplitude stochastic variability with fluctuations in I-band of up to 0.05 mag, 443 stars present irregular variability of higher amplitude (76% of these are reported as variables for the first time), 205 are eclipsing binaries (including 101 newly discovered systems), 50 are candidate rotating variables, 126 are classical Cepheids, 188 stars exhibit short-term sinusoidal periodicity (P < 3 days) making them candidate "slowly pulsating B stars" and non-radial Be pulsators, and 61 periodic stars exhibit longer periods. We demonstrate the wealth of information provided in the time domain, by doubling the number of known massive eclipsing binary systems and identifying 189 new candidate early-type Be and 20 Oe stars in the SMC. In addition, we find that ~80% of Be stars are photometrically variable in the OGLE-III time domain and provide evidence that short-term pulsating stars with additional photometric variability are rotating close to their break-up velocity.

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