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POLARIMETRIC EXPERIMENTS OF LUNAR SOIL SAMPLES BY PARTICLE SIZE

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Polarization properties of the moon provide valuable insights into lunar soil information such as grain size and composition. Polarization phase curves provide these properties but there is a lack of related research and laboratory measurements using lunar samples. For this reason, we have performed polarimetric experiments at four phase angles (15°, 20°, 25°, and 100°) using Apollo soil samples in multi-band (B, V, and R). A total of five Apollo samples (14163, 14260, 61141, 61221, and 65701) were used. The samples have been divided into different size groups (<25, 25–45, 45–90, and 90–150 m) including the bulk group (<150 m). Our investigation focuses on the effect of grain size on the degree of polarization (DoP) and its wavelength dependence. We show that DoP increases as the grain size increases up to the small size group (25–45 m), but the larger size groups show various trends. This is different from the results of experiments using terrestrial samples in which particle size and DoP are proportional. Also, for all samples, DoP decreases with increasing the wavelength. In addition, we analyze the negative branch at phase angles between 15° and 25°. In the negative branch, minimum DoP and inversion angle are measured to study their relationship to grain size.