

Study of the opposition surge of Asteroid 4 Vesta

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We present the results of photometric observations for the asteroid 4 Vesta in the B, Rc, and z' band at the minimum phase angle 0.1 deg has been performed at four small telescopes.

The magnitude reduced to unit distance and phase angle: $M_B(1, 1, 0) = 3.85 \pm 0.05$ mag, $M_{Rc} = 2.71 \pm 0.04$ mag, and $M_{z'}(1, 1, 0) = 2.98 \pm 0.03$ were obtained in this study.

The absolute magnitude under the IAU H-G function are about 0.1 mag darker than the magnitude at the phase angle of 0deg based on the Shevchenko function model and the Hapke model.

Porosity of the optically active regolith on Vesta are estimated with the Hapke model yielding $\rho = 0.4-0.7$.

We found that the opposition effect for Vesta is made a contribution to not only the shadow-hiding effect but also the coherent backscattering effect which appears from around 1deg.

The amplitude of the coherent backscatter opposition effect of Vesta increases as the reflectance is brightening.

We suggested that multiple-scattering in optically active scale may contribute to the amplitude of the coherent backscatter opposition effect, B_C0, from the comparison with those for the other solar system bodies.

Keywords: asteroid, Vesta, opposition effect