OPPOSITION EFFECT OF LOW ALBEDO ASTEROIDS. V. G. Shevchenko[1], I. N. Belskaya[1], I. A. Tereschenko[1], [1]Astronomical Institute of Kharkiv National University, Sumska Str. 35, Kharkiv 61022, Ukraine, shevchenko@astron.kharkov.ua.

Introduction: The brightness behavior in the range of the opposition effect (OE) is found to be different for low, moderate and high albedo asteroids [1]. Maximal amplitude of the OE occurs for moderate albedo S and M asteroids, which can be explained by combined influence of main physical mechanisms such as shadow hiding and coherent backscattering. Low albedo asteroids display the smallest amplitudes of opposition effect and the largest dispersion of them as compared to moderate and high albedo asteroids. Some dark asteroids display a broad opposition effect with rather large amplitude (for example, 24 Themis, [2]), others appear a sharp increasing of brightness at phase angles <1 deg (419 Aurelia, [3]), and in some cases the behavior of brightness is practically linear down to subdegree phase angles (for example, 59 Elpis, [4]). What is the reason of observed differences? To investigate this question we carried out the special program devoted to detailed observations of the magnitude phase dependence of low albedo asteroids both in the linear part and in a region of the opposition effect including low phase angles <1 deg. As a result of this program, we have obtained the magnitude-phase relations for ten asteroids [3, 5]. Together with our previous observations and available observations of other authors, the sample of low albedo asteroids with well-measured phase curves increased to 31 asteroids. Here we present the preliminary results of analysis of opposition effect behavior for low albedo main belt asteroids.

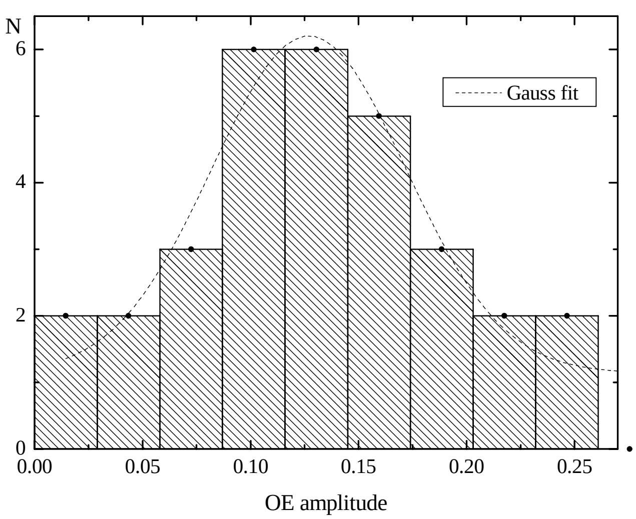

Figure 1. Distribution of the OE amplitude

Results and Discussion: We have determined the amplitude of OE according to [1] for 31 low albedo asteroids and performed the search of its possible correlations with different physical (albedo, diameter, color indexes, spectral slope and others) and dynamical (semiaxis, inclination, eccentricity and others) characteristics. The histogram of distribution of the OE amplitudes and its Gaussian fit are shown in the Figure 1. The maximum of distribution is 0.13 mag characterizing a simple average value for all data set. It can be considered as the mean value of the OE amplitude for low albedo asteroids. About 25% asteroids in the considered sample show extreme values of the OE amplitude both very small (less than 0.03 mag) and considerably large (more than 0.2 mag). We found correlation of the OE amplitude of low albedo asteroids with their color index U-B. The OE amplitude tends to increase with an increasing of the color index, or in other words, with the increasing of the spectral slope in the UV part of spectrum. The existing of such a correlation can be explained by assuming an increase of a portion of light substance in surface layer of asteroids, which can cause both the increasing of OE effect and spectral slope. An albedo of such surfaces changes slightly to be measurable within the available accuracy that is why the correlation of the OE amplitude and albedo is not seen.

Conclusion: As a result of our investigation of the brightness behavior of low albedo asteroids, we have shown that the mean amplitude of OE is 0.13 mag while about 25% of measured asteroids are characterized both by very low (<0.03 mag) and by rather large (>0.2 mag) amplitudes. Increasing of the OE amplitude with increasing U-B color index can be explained by a presence of a small portion of light substance in surface layer led to increasing contribution of the coherent backscattering mechanism in the forming of OE.

References: [1] Belskaya I. N., and Shevchenko V. G. (2000) *Icarus*, *146*, 490-499. [2] Harris A. W., et al. (1989) *Icarus 77*, 171-186. [3] Belskaya I.N., et al. (2002). *In Proceedings of Asteroids, Comets, Meteors 2002*, 489-491. [4] Shevchenko V.G., et al. (1996) *Astron. Astrophys. Suppl. Ser. 115*, 1-6. [5] Shevchenko V.G., et al. (2008) *Icarus*, accepted.