A Simple Methodology to Measure Lunar Distance and Lunar Radius

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The project is comprised of two essential sets of experiments related to the Moon: the measurement of the Earth-Moon distance and lunar radius. The ultimate aim of our research is to explore the feasibility and the minimum error of the basic measurements of lunar parameters within the capability of high school students. In the first experiment, we have measured the Earth-Moon distance. We conceived two formulas derived from radius of the Earth and baseline between two positions of the same longitude on the Earth to calculate the distance between the Moon and the Earth. The results of the two formulas were identical with those of Stellarium (software). Then we chose Beijing and Hangzhou, which were on the approximately same longitude on the Earth, to measure meridian altitude above pole of the Moon in horizontal coordinate system for 7 days. With the aid of the formula, we finally calculated the distance between the Moon and Beijing. The error compared to the software was 1%. In the second experiment, we have calculated the radius of the Moon. We seized the opportunity to take photos of total lunar eclipse. We applied the model that deduced from radius of the Earth, radius of the Sun, the Earth-Moon distance and the Sun-Earth distance. With the assistance of Photoshop CS6 (software), we obtained the points of lunar circle in coordinate. After that, we encoded a procedure with Visual Basic (software) by ourselves to analyze data. Eventually the error of the radius of the Moon was 3.425%.

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