NEAR Optical Navigation at Eros

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Successful navigation of the spacecraft NEAR Shoemaker during its orbit phase at the asteroid Eros depended critically on optical navigation. The irregular shape of Eros and its large apparent size precluded the use of traditional optical navigation techniques whereby the center of mass of a target body is located relative to stars in onboard imaging. Rather, optical navigation during NEAR Shoemaker's orbit phase consisted of locating small craters in images of Eros' surface and using those landmarks to infer Eros' rotation state, the body-fixed coordinates of each landmark, and the trajectory of the spacecraft.