Astrodynamics

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Such orbits have protracted HSF launch opportunities several years in duration, but these accessibility seasons may be separated by intervals from decades to a century.

Second, close NEO approaches to Earth associated with HSF mission opportunities are also the only occasions permitting Earthbound observers to detect small ones ~100 m in diameter or less. This leaves little time to prepare and dispatch a HSF mission during an accessibility season.

Third, by conducting a NEO survey from the SEL1 libration point or from interplanetary space between the orbits of Venus and Earth, a poten-tial HSF destination such as 2013 BS_{45} can be observed years or decades in advance of a close Earth approach. These observations will likely leave adequate time to prepare for and utilize the most practical HSF mission opportunities.

Fourth, some Earthlike NEO orbits display a horseshoe character in which close approaches leading and trailing Earth are achieved with regularity, but the Sun-Earth line is never crossed. Earth gravity perturbations during these close approaches impart turnarounds in the heliocentric rate at which the NEO is chasing Earth or vice-versa. Because NEOs in horseshoe orbits possess extremely long synodic periods and have only been observed for the past decade or two, little is certain about the long-term dynamical stability of such orbits.
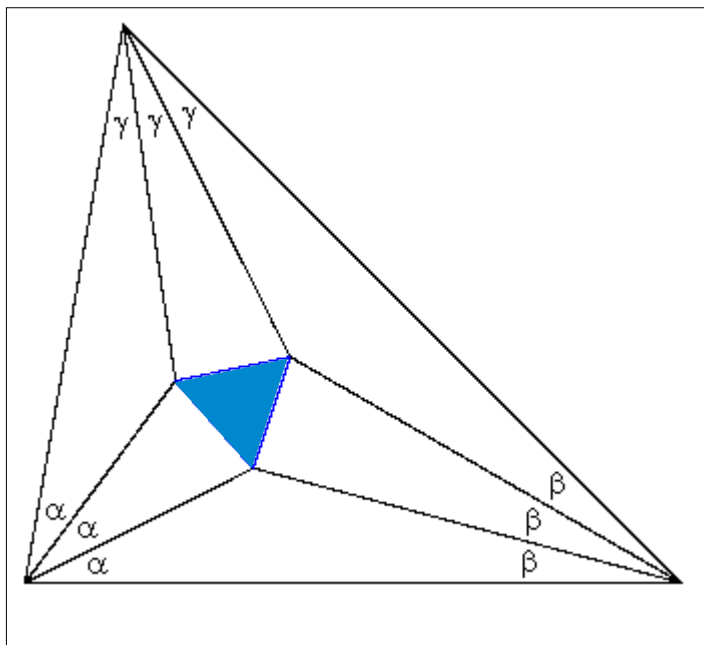
Cranium Cruncher

Prove this Triangle is Equilateral
DOUGLAS YAZELL, EDITOR, FILLING IN FOR DR. STEVEN E. EVERETT

Above: A web site called MathPages by Kevin Brown (author) includes Morley's trisection theorem. Image credit: Kevin Brown.

My great friend Jean-Marie Lemaitre showed me this brain teaser about two years ago. He showed me a quick sketch like the figure at left. On May 29, 2013, I was able to find the question and answer thanks to a Google search which found an unusual web site. The web site, MathPages, seems to be the creation of author Kevin Brown. The question and answer appear here on his web site, along with excellent history notes. By the way, Jean-Marie teaches mathematics in Hong Kong at the moment. He is no relation to Georges Lemaitre. The fifth Automated Transfer Vehicle (ATV) from the European Space Agency is named after Georges Lemaitre. Based in part on that excellent ATV program success, NASA's first Orion crew capsule spacecraft will have an ESA Service Module.

MathPages includes animated GIFs. My iPad 1 news aggregator application Flipboard showed me a web site with excellent animated GIFs created by PATAKK. Below is a screen capture image of one of those animated GIFs.