First International ASI Workshop on
Futuristic Space Technologies

6 – 7 May, 2002
Trieste, Italy

"The InterPlanetary Superhighway and the Development of Space"

Martin W. Lo
Navigation and Mission Design
Jet Propulsion Laboratory
California Institute of Technology

Abstract

Our Solar System is interconnected by a vast system of tunnels and passageways called "The InterPlanetary Superhighway (IPS)". Loosely speaking, IPS is the family of invariant manifolds generated by the Lagrange points of all the planets and moons in the Solar System. IPS contributes to our understanding of various transport phenomena within the Solar System. Comet ShoemakerLevy9 and the killer asteroid which caused the extinction of dinosaurs are conjectured to have traveled the IPS to their demise. On the other hand, the materials of life may also have been brought to Earth via the IPS. Today, NASA is using the IPS to plan ultra-low-energy missions. For example, we used it to compute the orbit for the Genesis spacecraft, which launched in August 2001 and will bring solar wind samples back to Earth in 2004. IPS is enabling many new mission concepts beyond Genesis, some examples are: formation flight for terrestrial exo-planet detection, human servicing of space missions from a lunar L_1 Gateway station, sample return missions from the Moon and Mars.