Born in Spain in 1969, Dr. Juan Senent attended the Technical University of Valencia to complete his studies in computer science and automatic control systems. Years later he became assistant professor at the same university where he obtained his tenure. In 2001, he became a technical fellow at the Department of Aerospace Engineering at University of Texas at Austin where he did research on Optimization and control of space trajectories. In 2003 he joined Odyssey Space Research as a research engineer and is currently working as a contractor at the Johnson Space Center where he develops software for trajectory optimization (Copernicus). He is currently part of the team designing human missions to asteroids. Dr. Senent is the co-author of several books and articles in the areas of automatic control systems and trajectory optimization.

Thursday, Mar. 31, 2011 4:00 – 5:00 p.m. Room 112, ME-EM Bldg.


Consider designing a spacecraft trajectory that will visit as many asteroids as possible using the least amount of propellant, in the shortest amount of time, with only a tiny engine. Now, consider designing the trajectory of a spacecraft that collects as many pieces of space debris using minimum propellant. What these problems have in common is that in order to solve them, a large and complex optimization problem has to be solved. Developing software to solve these problems in a fast and accurate way is in itself a challenge. But if we take into account that the software has to be general enough to solve other trajectory optimization problems, should incorporate state of art algorithms while maintaining legacy code, should run in single computing environments and also in computer clusters and should also help the designer to understand the solution by graphically interacting with it, the software development process becomes as complicated as the problem it is trying to solve. This presentation will outline some of the challenges encountered while developing the Copernicus trajectory tool as well as examples of trajectory optimization problems solved with this tool.