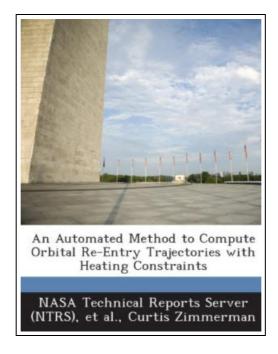
An Automated Method to Compute Orbital Re-Entry Trajectories with Heating Constraints



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AN AUTOMATED METHOD TO COMPUTE ORBITAL RE-ENTRY TRAJECTORIES WITH HEATING CONSTRAINTS



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Bibliogov, United States, 2013. Paperback. Book Condition: New. 246 x 189 mm. Language: English . Brand New Book ***** Print on Demand ******. Determining how to properly manipulate the controls of a re-entering re-usable launch vehicle (RLV) so that it is able to safely return to Earth and land involves the solution of a two-point boundary value problem (TPBVP). This problem, which can be quite difficult, is traditionally solved on the ground prior to flight. If necessary, a nearly unlimited amount of time is available to find the best solution using a variety of trajectory design and optimization tools. The role of entry guidance during flight is to follow the pre-determined reference solution while correcting for any errors encountered along the way. This guidance method is both highly reliable and very efficient in terms of onboard computer resources. There is a growing interest in a style of entry guidance that places the responsibility of solving the TPBVP in the actual entry guidance flight software. Here there is very limited computer time. The powerful, but finicky, mathematical tools used by trajectory designers on the ground cannot in general be made to do the job. Nonconvergence or slow convergence can result in disaster. The challenges of designing such an algorithm are numerous and difficult. Yet the payoff (in the form of decreased operational costs and increased safety) can be substantial. This paper presents an algorithm that incorporates features of both types of guidance strategies. It takes an initial RLV orbital re-entry state and finds a trajectory that will safely transport the vehicle to a Terminal Area Energy Management (TAEM) region. During actual flight, the computed trajectory is used as the reference to be flown by a more traditional guidance method.



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