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3-DIMENSIONAL ANALYTICAL SOLUTION FOR LUNAR DESCENT SCHEME

Abstract

This paper deals with a 3-dimensional analytical modeling of descent scheme for lunar landing spacecraft. Spacecraft motion control system is very important for safely landing on the moon surface. To reduce complexity and to increase performance in landing system motivates to develop a new idea for lunar lander descent scheme. Solution of lunar descent can be either numerical or analytical. Numerical solution is the ideal solution but complex, not suitable for real-time precise landing application. On the other hand, analytical solution is not complex and much more attractive for the same purpose. Available solution scheme presented two dimensional analysis considering altitude and down range to describe reference trajectory of lunar descent. In this proposed research 3-dimensional analysis is presented considering cross range distance along with altitude and down range of descent trajectory for both numerical and analytical solution. In this paper it is demonstrated that 3-dimensional reference trajectory is crucial for precise lunar landing spacecraft. Comparisons are made by simulation response between numerical and analytical solutions. Detail mathematical derivation are presented in this paper as well.