

Some Aspects Regarding the Speed of a Horizontally Launched Rocket in an Undisturbed Atmosphere

Octavian Preotu

University of Craiova, Faculty of Electrical Engineering, Craiova, Romania,
opreotu@yahoo.com

Abstract— The paper is an extension of the study of the dynamics of a variable mass object in the case of a rocket. In the usual dynamics calculations body mass variable is not taken into account drag effect that characterizes the evolution of the Earth's atmosphere with a certain density ρ at a certain altitude H . In this study rocket flight can not be neglected. Instantaneous speeds are determined in two typical situations: the mass decreases by a linear law / the mass decreases by exponential law as per Kosmodemianskii's assumptions. When calculating mass change after the exponential law, we reach an equation of the Riccati type, which has not always given a particular solution. Considered if there is a particular solution, thus determining the analytical expression of the rocket flight speed. Basic issues regarding the movement of a horizontally launched rocket are being studied, such as determining the instantaneous speed and final speed. The case of a rocket launched from a mobile platform at a certain altitude is being examined, such as a rocket that is being launched from a plane. The case of a rocket launched from a fixed platform is also examined, such as infantry antitank rockets. These studies were made especially for missiles with solid fuel engines, which traction can be adjusted by setting the corresponding geometric features. Obviously, if equipped with rocket fuel, the results are valid, because automated systems can perform various calculations regulating combustion.