



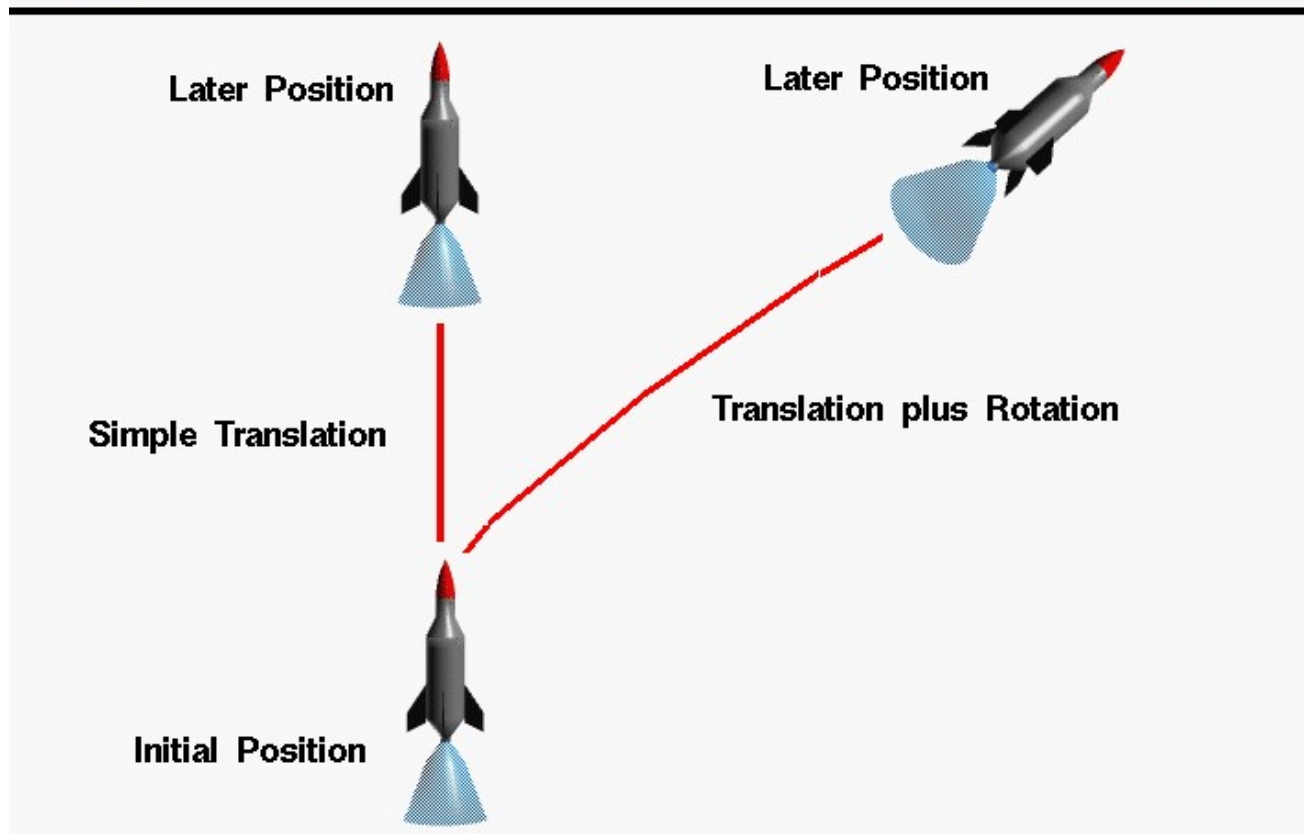
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Basic Rocket Motion

Translation and Rotation



We live in a world that is defined by three spatial dimensions and one time dimension. Objects move within this domain in two ways. An object [translates](#), or changes **location**, from one point to another. And an object [rotates](#), or changes its **attitude**. In general, the motion of any object involves both translation and rotation. The translations are in direct response to external [forces](#). The rotations are in direct response to external [torques](#) or moments (twisting forces).

The [motion](#) of a rocket is particularly complex because the rotations and translations are coupled together; a rotation affects the magnitude and direction of the forces which affect translations. To understand and describe the motion of a rocket, we usually try to break down the complex problem into a series of easier problems. We can, for instance, assume that the rocket translates from one point to another as if all the mass of the rocket were collected into a single point called the [center of gravity](#). We can describe the motion of the center of gravity by using Newton's [laws of motion](#). In general, there are four [forces](#) acting on the rocket; the weight, thrust, drag and lift.

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