Autonomous Vehicle Simulation (AVS) Laboratory, University of Colorado

Basilisk Technical Memorandum
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MODULE TO APPLY A PRESCRIBED FORCE OR TORQUE ONTO A RIGID BODY

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Status: First Version
Scope/Contents
This module allows an external force and/or torque about a body fixed point B to be prescribed through either direct input from python, or through a message.

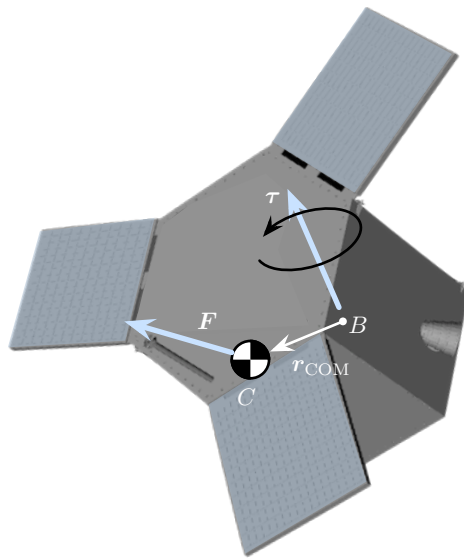| Rev:	Change Description	By
v1.0	Initial document	H. Schaub

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Fig. 1: Illustration of Force and Torque acting on a rigid body

1 Introduction

This module allows a general force $\boldsymbol{F}$ or torque $\boldsymbol{\tau}$ to be applied onto a rigid body. The force is the net external force acting through the center of mass, and can be specified in inertial $\mathcal{N}$ or body-frame $\mathcal{B}$ coordinates. The torque is taken about the body-fixed point B, and the vector components are given in the body frame $\mathcal{B}$.

2 Specifying the Forces/Torques through Messages

The module reads in a message that specifies an external force or external torque. Not that there essentially are 3 input options. The torque vector is always provided in body frame vector components. The external force can be provided as a vector with respect to the inertial or body frame. **Note, it is possible to set both types, but this applies 2 separate vectors to the rigid body.**

3 Module Parameters

The forces and torque vectors can also be set directly from python. These values are added up in addition ot the messages set above.

3.1 extTorquePntB_B **Parameter**

This vector sets the external torque, about point B, in $\mathcal{B}$ body-frame vector components.

3.2 extForce_N **Parameter**

This vector sets the external force $\boldsymbol{F}$ in $\mathcal{N}$ inertial-frame vector components.

3.3 extForce_B **Parameter**

This vector sets the external force $\boldsymbol{F}$ in $\mathcal{B}$ inertial-frame vector components.