Problem I – Question 1

1. Given Yaw = 30°, Pitch = 30°, and Roll = 20°

This is a 3-2-1 rotation because the standard notation is that roll is a rotation about , pitch is a rotation about , and yaw is a rotation about . Also, it is known that “the standard yaw-pitch-roll (ψ; θ; φ) angles are the (3-2-1) set of Euler angles” (Junkins and Schaub, p. 87).

1. The DCM for a 3-2-1 rotation is known and shown in Figure 1.

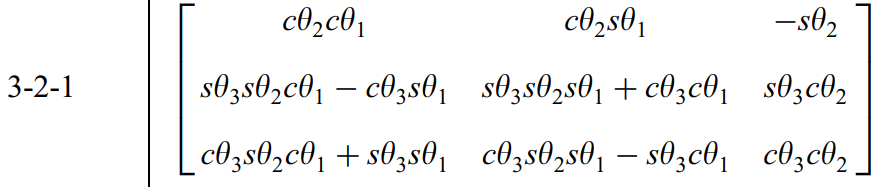


Figure : 3-2-1 rotation matrix. Source: Junkins and Schaub, Appendix B

where is the yaw, is the pitch, and is the roll. Plugging the numbers in yield the following DCM.

References:

Junkins, J., Schaub, H., *Analytical Mechanics of Space Systems, Fourth Edition (AIAA Education Series)*, AIAA American Institute of Aeronautics & Ast, April 2018