# Test Cases

**Test Case 1:** Single Axis Rotation

**Expected Result:** Simulation will maintain a constant angular velocity about the axis of rotation.

**Conditions:** N = [0 0 0] (N-m), I = [7 7 3] (kg\*m^2), t = 20 (s)

**Test 1:** w = [0 0 10] (rad/s)

**Test 2:** w = [10 0 0] (rad/s)

**Test 3:** w = [0 10 0] (rad/s)

**Test 4:** w = [0 0 -10] (rad/s)

**Test Case 2:** Double Axis Rotation (Symmetric Axes)

**Expected Result:** No acceleration on any axis, w remains constant

**Conditions:** N = [0 0 0] (N-m), I = [7 7 3] (kg\*m^2), t = 20 (s),

**Test 1:** w = [5 3 0]

**Test 2:** w = [-8 -4 0]

**Test 3:** w = [-6 9 0]

**Test Case 3:** Triple Axis Rotation

**Expected Result:** Constant value for w3, w1 and w2 oscillating sinusoidally. The value of the angular velocity in the 1-2 plane, where , remains constant. If w3 is positive, then w12 should rotate clockwise. If w3 is negative, then w12 should rotate counterclockwise. w1 and w2 should have the same max and min values, the magnitude of which is equal to w12.

**Conditions:** N = [0 0 0] (N-m), I = [7 7 3] (kg\*m^2), t = 20 (s),

**Test 1:** w = [5 0 3]

**Test 2:** w = [0 6 3]

**Test 3:** w = [2 3 5]

**Test 4:** w = [-5 2 6]

**Test 5:** w = [5 0 -3]

**Test 6:** w = [0 6 -3]

**Test 7:** w = [2 3 -5]

**Test 8:** w = [-5 2 -6]

# Test Results

To analyze results, see file Test\_#.#.mat for corresponding test.

**1.1:** Performed as expected.

**1.2:** Performed as expected.

**1.3:** Performed as expected.

**1.4:** Performed as expected.

**2.1:** Performed as expected.

**2.2:** Performed as expected.

**2.3:** Performed as expected.

**3.1:** Performed as expected.

**3.2:** Performed as expected.

**3.3:** Performed as expected.

**3.4:** Performed as expected.

**3.5:** Performed as expected.

**3.6:** Performed as expected.

**3.7:** Performed as expected.

**3.8:** Performed as expected.