Lecture Comprehension, Twists (Chapter 3.3.2, Part 2 of 2)

TOTAL POINTS 2

1. What is the dimension of the matrix adjoint representation $[\mathrm{Ad}_T]$ of a transformation matrix T (an element of $SE(3)$)? **1 / 1 point**

- ○ 3x3
- ○ 4x4
- ◉ 6x6

✓ **Correct**

The adjoint representation $[\mathrm{Ad}_{T_{ab}}]$ of a transformation matrix T_{ab} can be used to change the frame of representation of a twist (or a screw), i.e., $\mathcal{V}_a = [\mathrm{Ad}_{T_{ab}}]\mathcal{V}_b$, so it must be 6x6.

2. A 3-vector angular velocity ω can be represented in matrix form as $[\omega]$, an element of $so(3)$, the set of 3x3 skew-symmetric matrices. Analogously, a 6-vector twist $\mathcal{V} = (\omega, v)$ can be represented in matrix form as $[\mathcal{V}]$, an element of $se(3)$. What is the dimension of $[\mathcal{V}]$? **1 / 1 point**

- ○ 3x3
- ◉ 4x4
- ○ 6x6

✓ **Correct**

The top left 3x3 submatrix is $[\omega]$ and the top right 3x1 submatrix is the linear velocity v. The bottom row consists of four zeros.