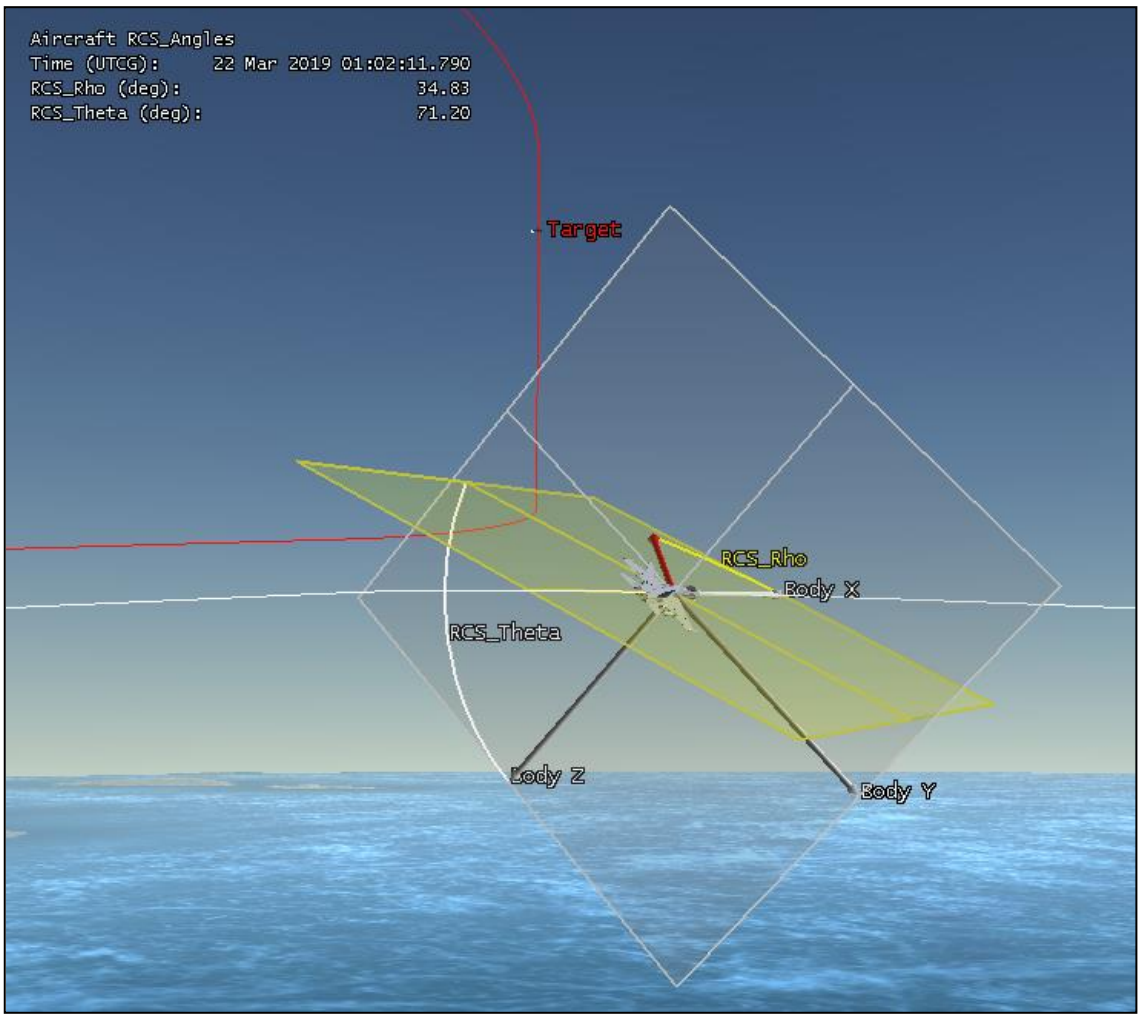
RCS Angles – Computing and Visualizing Rho/Theta in STK

Rho is defined as the angle between the incident vector and the nose of the aircraft. By convention, the **Body X** axis aligns with the aircraft's nose.

Theta is an angle measured entirely in the **Body YZ** plane (perpendicular to the aircraft's nose direction). Theta is measured relative to the **Body Z** axis, and is equal to the angle between the aircraft **Body Z** axis and the *projection* of the incident vector onto the aircraft **Body YZ** plane.

The **Rho** and **Theta** angles are shown below:

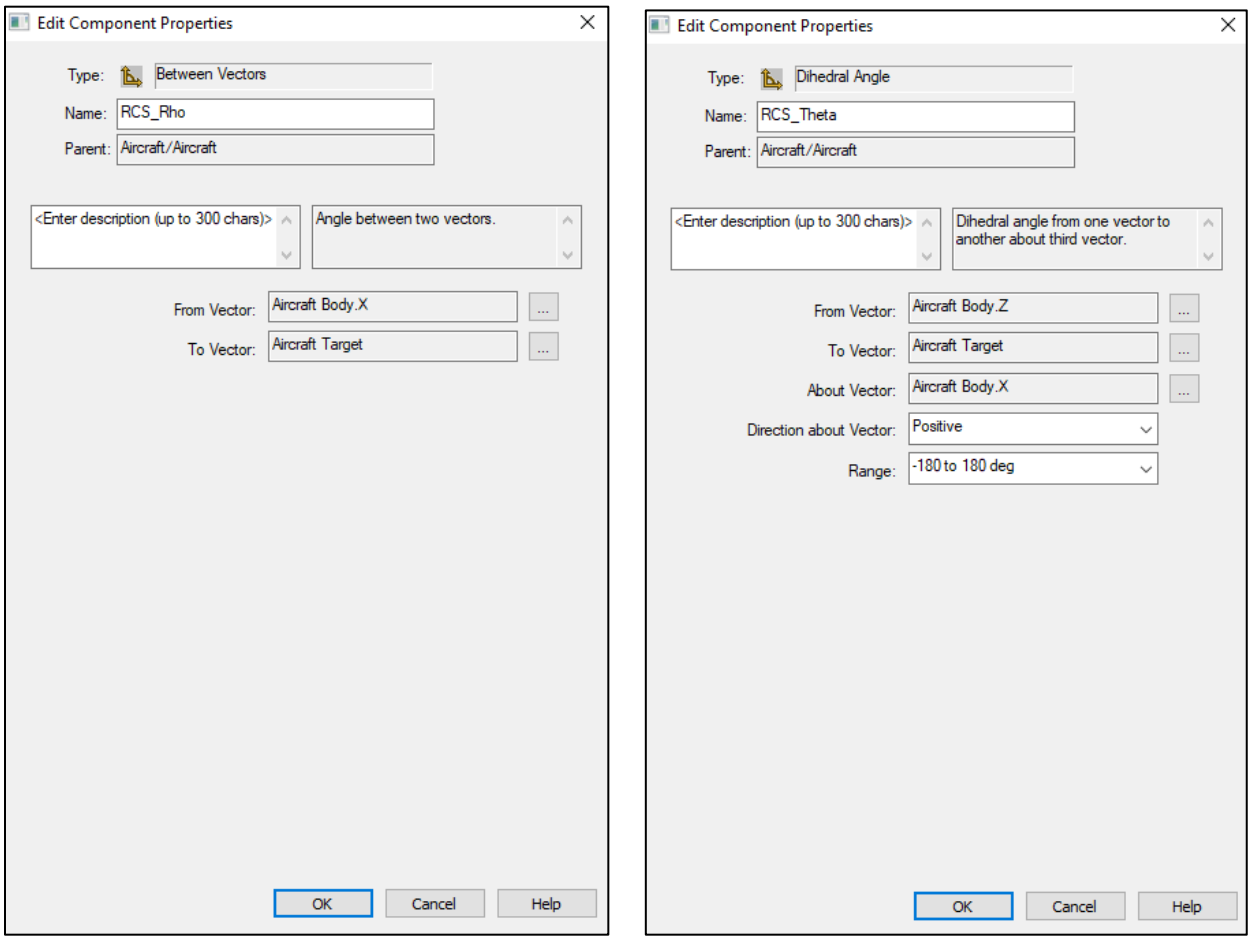
- The aircraft's nose is aligned with the **Body X** vector, and the incident vector is shown in *red*. The **Body YZ** plane is shown in white.
- **Rho** is the angle between the **Body X** and incident vectors (arc shown in yellow). The yellow plane shows the plane that Rho lives in – it contains the incident vector and the aircraft **Body X** vector.
- **Theta** lives entirely in the **Body XY** plane. It is measured between the **Body Z** axis and the *projection* of the incident vector onto the **Body YZ** plane (intersection of the yellow/white planes).



Rho & Theta Angles

In STK, Rho can be calculated using a **Between Vectors** angle in Analysis Workbench.

Theta can be modeled by creating a **Dihedral Angle** in Analysis Workbench. With the **Dihedral Angle**, theta is forced to live *entirely* in the **Body YZ** plane.



Rho and Theta angle definitions in STK

Visualize and Report

Visualize the angles on the **Aircraft Properties > 3D Graphics > Vector** window. The dihedral angle supporting arcs can be shown if desired.

To report or graph the values of Rho and Theta, a custom report or graph can be created with data providers from the **Angles** group. By adding **Time, RCS_Rho, RCS_Theta** a data display/report can be created, or a graph can be generated.