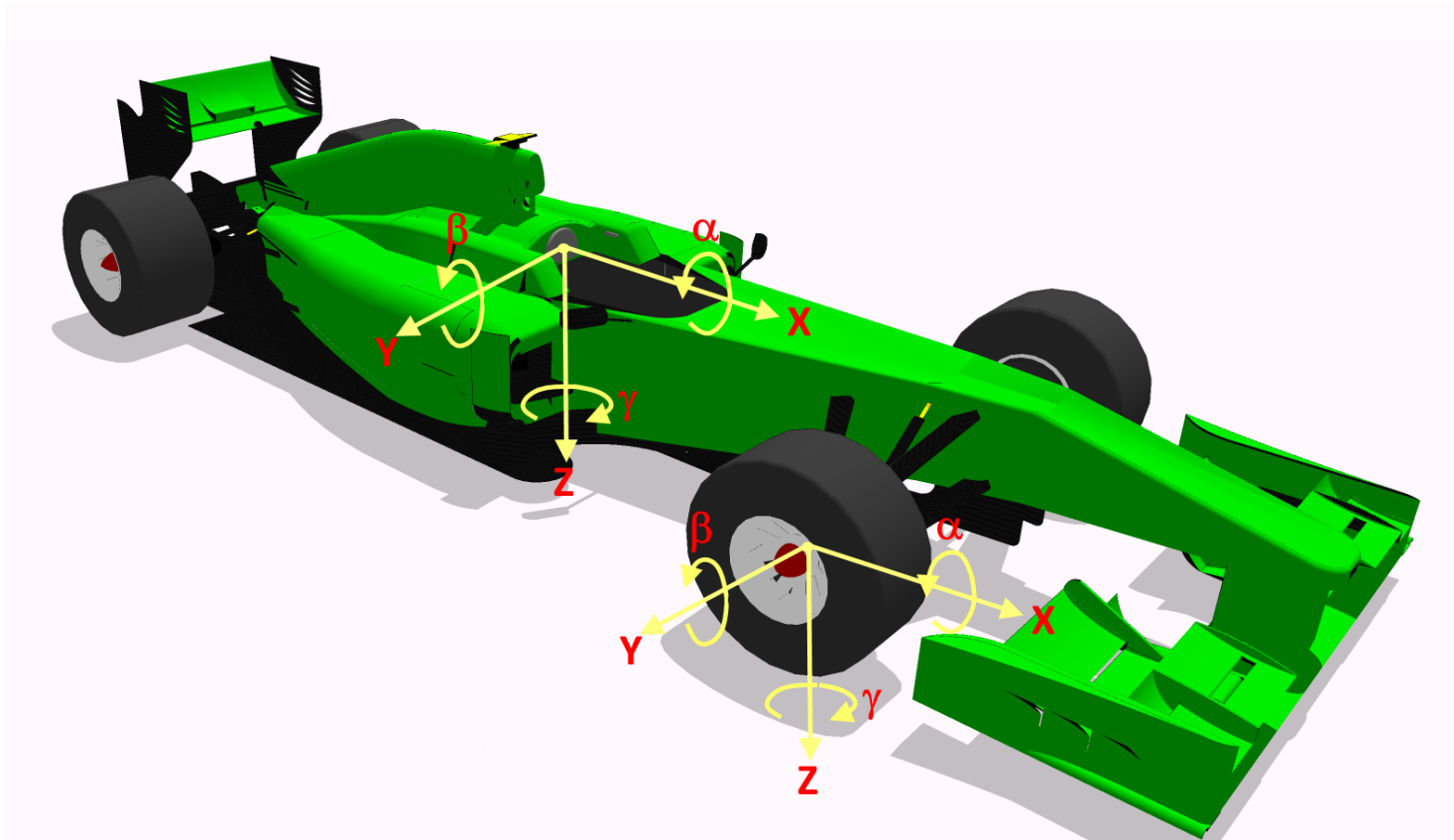


- **x-displacement**, +ve in the car-forward direction;
- **y-displacement**, +ve rightwards, as one looks down the car from above;
- **z-displacement**, +ve downwards;
- **roll angle**; rotation about the car x-axis, +ve rotation causes the left side of the car to rise and the right to drop;
- **pitch angle**; rotation about the car y-axis, +ve rotation causes the nose to rise;
- **yaw angle**; rotation about the car z-axis, +ve rotation moves the nose of the car rightwards.
- **slip ratio**; +ve during acceleration, produces a +ve F_{xTyre} .
- **slip angle**; toe-out in a straight line causes +ve a_{Steer} (on the right hand tyre), but a_{Slip} is the angle between the direction the tyre is pointing, and the direction the tyre is going which is -ve. This produces +ve F_{yTyre} .

Each coordinate system is *right handed*. The [figure below](#) shows the car with coordinate systems marked.



Units

For most parameters and channels it is possible to manually select the units displayed in the car editor or results viewer and the user choice is remembered, however, internally all simulations rigorously use SI units. For inputting maps or lookup tables where you cannot specify the unit choice then SI units should be used. Some examples include engine speed in rad/s, torque in Nm, pressure in Pa.

Reference Positions

All point coordinates on the car (such as suspension pickup points) are defined relative to a datum position. The specific position of this datum is largely irrelevant, however in the case of the default car used by Canopy the following convention applies:

- The x-datum is an arbitrarily chosen point along the length of the car.
- The y-datum is on the centre-line of the car.
- The z-datum lies on the floor of the car, known in F1 as the Z_{a0} plane.

A common choice for the reference position is the intersection of the front bulkhead, the reference plane (top surface of the plank in F1) and the car centreline. This is commonly used as the origin for car design which means that numbers can be taken directly from the drawing; take care though that the directions and sign conventions used in the design drawings are translated correctly into the car coordinate frame as laid out in [coordinates](#). Whatever your reference position, users must ensure that all physical locations on the car are in the same coordinate system. To enable you to more easily visualise the locations of the suspension pickup points, the *Verify Car* views include a layout of the suspension members as shown below.