



Figure XII.1: Yaw, pitch, and roll represent rotations around the y -axis, the x -axis and the z -axis. If the axes move with the object, then the rotations are performed in the order yaw, then pitch, and finally roll. If the axes are taken as fixed, then the rotations are performed in the opposite order: roll, then pitch, then yaw. Rotation directions are determined by the righthand rule. The reader is warned that the rotation directions for pitch and yaw that are shown in the figure are opposite to customary usage in aviation. For us, a positive pitch means the nose dips down and a positive yaw steers to the left. However, aviation conventions are that a positive pitch means the nose moves up, and a positive yaw means turning to the right. It is customary for positive roll to mean that the right wing dips, which agrees with the our convention. In aviation conventions, the directions of the x and y axes are reversed, with the x -axis pointing rightward and the y -axis pointing downward.