Slow (kinematic) model discretization

$$\frac{\partial \dot{x}_1}{\partial x_4} = \cos(x_5 + x_7) \qquad \frac{\partial \dot{x}_1}{\partial x_5} = -x_4 \cdot (\sin(x_5 + x_7)) \qquad \frac{\partial \dot{x}_1}{\partial x_7} = -x_4 \sin(x_5 + x_7)$$

$$\frac{\partial \dot{x}_2}{\partial x_4} = \sin(x_5 + x_7) \qquad \frac{\partial \dot{x}_2}{\partial x_5} = x_4 \cdot \cos(x_5 + x_7) \qquad \frac{\partial \dot{x}_2}{\partial x_7} = x_4 \cos(x_5 + x_7)$$

$$\frac{\partial \dot{x}_3}{\partial u_1} = 1 \qquad \frac{\partial \dot{x}_4}{\partial u_2} = 1 \qquad \frac{\partial \dot{x}_5}{\partial x_3} = \frac{x_4 \cdot \cos(x_7)}{l_{wb}} \cdot \frac{1}{\cos^2(x_3)}$$

$$\frac{\partial \dot{x}_5}{\partial x_4} = \frac{\cos(x_7)}{l_{wb}} \cdot \tan(x_3) \qquad \frac{\partial \dot{x}_5}{\partial x_7} = -\frac{x_4 \tan(x_3)}{l_{wb}} \cdot \sin(x_7)$$

$$\frac{\partial \dot{x}_6}{\partial x_3} = \frac{1}{l_{wb}} \cdot \left(u_2 \cdot \cos(x_7) \cdot \frac{1}{\cos^2(x_3)} - x_4 \cdot \sin(x_7) \cdot \left(\frac{1}{\cos^2(x_3)} \cdot \dot{x}_7 + \tan(x_3) \cdot \frac{\partial \dot{x}_7}{\partial x_3} \right) + \right.$$

$$\left. + x_4 \cdot \cos(x_7) \cdot u_1 \cdot 2 \cdot \frac{\sin(x_3)}{\cos^3(x_3)} \right)$$

$$\frac{\partial \dot{x}_6}{\partial x_4} = \frac{1}{l_{wb}} \cdot \left(-\sin(x_7) \cdot \tan(x_3) \cdot \dot{x}_7 + \frac{\cos(x_7)}{\cos^2(x_3)} \cdot u_1 \right)$$

$$\frac{\partial \dot{x}_6}{\partial x_7} = \frac{1}{l_{wb}} \cdot \left(-u_2 \tan(x_3) \cdot \sin(x_7) - x_4 \cdot \tan(x_3) \cdot \dot{x}_7 \cdot \cos(x_7) - \frac{x_4 \cdot u_1}{\cos^2(x_3)} \cdot \sin(x_7) \right)$$

$$\frac{\partial \dot{x}_6}{\partial u_1} = \frac{1}{l_{wb}} \cdot \left(\frac{x_4 \cdot (\cos(x_7))}{\cos^2(x_3)} \right) \qquad \frac{\partial \dot{x}_6}{\partial u_2} = \frac{1}{l_{wb}} \cdot \left(\cos(x_7) \cdot \tan(x_3) \right)$$

$$\frac{\partial \dot{x}_7}{\partial x_3} = -\frac{2 \cdot \left(\tan(x_3) \cdot \frac{l_r}{l_{wb}} \right) \cdot \frac{l_r}{l_{wb}} \cdot \frac{1}{\cos^2(x_3)}}{\left(1 + \left(\tan(x_3) \cdot \frac{l_r}{l_{wb}} \right)^2 \right)^2} \cdot \frac{l_r}{l_{wb}} \cdot \frac{u_1}{\cos^2(x_3)} + \frac{u_1}{1 + \left(\tan(x_3) \cdot \frac{l_r}{l_{wb}} \right)^2} \cdot \frac{l_r}{l_{wb}} \cdot 2 \cdot \frac{\sin(x_3)}{\cos^3(x_3)}$$

$$\frac{\partial \dot{x}_7}{\partial u_1} = \frac{1}{1+\left(tg(x_3)\cdot\frac{L_r}{L_{wb}}\right)^2}\cdot\frac{L_r}{L_{wb}}\cdot\frac{1}{\cos^2(x_3)}$$