## List of coefficients

## 1. Mass matrix

Name	Expression	Multiplies matrix term	Multiplies acceleration variable	Associated speeds (Kinetic energy)	Index in matrix
$\sigma_1$	$m+m_p$	1	ÿ	$\dot{x}^2$	1,1
			ÿ	<i>y</i> <sup>2</sup>	2,2
$\sigma_2$	$2l_1m_w - m_bx_G$	$s_{\alpha-\varphi_p}$	ä	χά	1,3
		$c_{\alpha-\varphi_p}$	$\ddot{arphi}_p$	$\dot{y}\dot{m{\phi}}_{p}$	2,6
	$-2l_1m_w + m_bx_G$	$c_{\alpha-\varphi_p}$	ä	ÿά	2,3
		$s_{\alpha-\varphi_p}$	$\ddot{\varphi}_p$	$\dot{x}\dot{oldsymbol{arphi}}_{p}$	1,6
$\sigma_3$	$-m_p x_F$	$s_{lpha}$	ä	χά	1,3
	$m_p x_F$	$c_{lpha}$	$\ddot{lpha}$	ÿά	2,3
$\sigma_4$	$-m_p y_{\scriptscriptstyle F}$	$c_{lpha}$	ä	χά	1,3
		$s_{lpha}$	$\ddot{lpha}$	ÿά	2,3
$\sigma_5$	$-m_b y_G$	$c_{\alpha-\varphi_p}$	ä	χά	1,3
		$s_{\alpha-\varphi_p}$	ä	ÿά	2,3
	$m_b y_G$	$c_{\alpha-\varphi_p}$	$\ddot{arphi}_p$	$\dot{x}\dot{arphi}_{p}$	1,6
		$s_{\alpha-\varphi_p}$	$\ddot{arphi}_p$	$\dot{y}\dot{arphi}_{p}$	2,6
$\sigma_6$	$2I_t' + I_b'$	1	$\ddot{arphi}_p$	$\dot{arphi}_p^{\ 2}$	6,6
			ä	$\dot{\alpha}^2$	3,3
	$-2I_t'-I_b'$	1	$\ddot{arphi}_p$	$\dot{lpha}\dot{arphi}_{p}$	3,6
$\sigma_7$	$I_p'$	1	ä	$\dot{\alpha}^2$	3,3
$\sigma_8$	$I_a$	1	$\ddot{arphi}_r$	$\dot{\varphi}_r^2$	4,4
			$\ddot{arphi}_l$	$\dot{arphi_l}^2$	5,5

$$m = m_b + 2m_w$$

$$I'_t = I_t + m_w (l_1^2 + l_2^2)$$

$$I'_p = I_p + m_p (x_F^2 + y_F^2)$$

$$I'_b = I_b + m_b (x_G^2 + y_G^2)$$