$$d_L = \frac{-Lk_l lm_x + \frac{Lk_l lm_y \cos{(2\varphi)}}{2} - \frac{3Lk_l lm_y}{2} - Lk_l l_0 m_x + \frac{Lk_l l_0 m_y \cos{(2\varphi)}}{2} - \frac{3Lk_l l_0 m_y}{2} - Xk_x lm_y \sin{(\varphi)} - Xk_x l_0 m_y \sin{(\varphi)} - \frac{c_\varphi m_y \phi \sin{(2\varphi)}}{2} - \frac{glm_y^2 \cos{(\varphi)}}{4} + \frac{glm_y^2 \cos{(3\varphi)}}{4} - \frac{gl_0 m_y^2 \cos{(\varphi)}}{4} + \frac{gl_0 m_y^2 \cos{(3\varphi)}}{4} + k_l lm_x v_l - \frac{k_l lm_y v_l \cos{(2\varphi)}}{2} + \frac{3k_l lm_y v_l}{2} + k_l l_0 m_x v_l - \frac{k_l l_0 m_y v_l \cos{(2\varphi)}}{2} + \frac{3k_l l_0 m_y v_l}{2} + k_x lm_y v_x \sin{(\varphi)} + k_x l_0 m_y v_x \sin{(\varphi)} + l^2 m_x m_y \phi^2 + l^2 m_y^2 \phi^2 + 2ll_0 m_x m_y \phi^2 + 2ll_0 m_y^2 \phi^2 + l_0^2 m_x m_y \phi^2 + l_0^2 m_y^2 \phi^2}{m_y (lm_x + lm_y + l_0 m_x + l_0 m_y)}$$

$$d_X = \frac{-Lk_l l \sin{(\varphi)} - Lk_l l_0 \sin{(\varphi)} - Xk_x l - Xk_x l_0 - c_\varphi \phi \cos{(\varphi)} - \frac{glm_y \sin{(2\varphi)}}{2} - \frac{gl_0 m_y \sin{(2\varphi)}}{2} + k_l lv_l \sin{(\varphi)} + k_l l_0 v_l \sin{(\varphi)} + k_x lv_x + k_x l_0 v_x}{lm_x + lm_y + l_0 m_x + l_0 m_y}$$

$$d_l = L$$

$$d_\phi = \frac{-\frac{Lk_l lm_y \sin{(2\varphi)}}{2} - \frac{Lk_l l_0 m_y \sin{(2\varphi)}}{2} - 2Llm_x m_y \phi - 2Llm_y^2 \phi - 2Ll_0 m_x m_y \phi - 2Ll_0 m_y^2 \phi - Xk_x lm_y \cos{(\varphi)} - Xk_x l_0 m_y \cos{(\varphi)} - c_\varphi m_x \phi - \frac{c_\varphi m_y \phi \cos{(2\varphi)}}{2} - \frac{3c_\varphi m_y \phi}{2} - glm_x m_y \sin{(\varphi)} - \frac{5glm_y^2 \sin{(\varphi)}}{4} - \frac{glm_y^2 \sin{(3\varphi)}}{4} - gl_0 m_x m_y \sin{(\varphi)} - \frac{5gl_0 m_y^2 \sin{(\varphi)}}{4} - \frac{gl_0 m_y^2 \sin{(3\varphi)}}{4} + \frac{k_l lm_y v_l \sin{(2\varphi)}}{2} + \frac{k_l l_0 m_y v_l \sin{(2\varphi)}}{2} + k_x lm_y v_x \cos{(\varphi)} + k_x l_0 m_y v_x \cos{(\varphi)}}{m_y (l + l_0)^2 (m_x + m_y)}$$

$$d_\varphi = \phi$$

$$d_x = X$$