$$\cos(\alpha(t))\cos(\theta(t)+\psi(t))\,M_{\mathrm{P2}}$$
$$\left(\cos(\theta(t))\,R(t)-\cos(\alpha(t))\cos(\theta(t)+\psi(t))\left(L_0+\eta_6(t)+\eta_7(t)+\eta_8(t)+\eta_9(t)+\eta_{10}(t)+\eta_{\mathrm{P2}}(t)\right)\right)$$
$$\zeta_{\mathrm{P2}}{}'(t)^2+\cos(\alpha(t))\cos(\theta(t)+\psi(t))\,M_{\mathrm{P2}}$$
$$\left(\cos(\theta(t))\,R(t)-\cos(\alpha(t))\cos(\theta(t)+\psi(t))\left(L_0+\eta_6(t)+\eta_7(t)+\eta_8(t)+\eta_9(t)+\eta_{10}(t)+\eta_{\mathrm{P2}}(t)\right)\right)$$
$$\chi_{\mathrm{P2}}{}'(t)^2-k_0\left(\eta_{10}(t)-\eta_{\mathrm{P2}}(t)\right)-$$
$$\frac{1}{2}\,M_{\mathrm{P2}}\left(2\left(\cos(\theta(t)+\psi(t))\sin(\alpha(t))\,\alpha'(t)+\cos(\alpha(t))\sin(\theta(t)+\psi(t))\left(\theta'(t)+\psi'(t)\right)\right)\right.$$
$$\left(\cos(\theta(t))\,R'(t)+\cos(\theta(t)+\psi(t))\sin(\alpha(t))\left(L_0+\eta_6(t)+\eta_7(t)+\eta_8(t)+\eta_9(t)+\eta_{10}(t)+\eta_{\mathrm{P2}}(t)\right)\right.$$
$$\alpha'(t)-R(t)\sin(\theta(t))\,\theta'(t)+\cos(\alpha(t))\sin(\theta(t)+\psi(t))$$
$$\left(L_0+\eta_6(t)+\eta_7(t)+\eta_8(t)+\eta_9(t)+\eta_{10}(t)+\eta_{\mathrm{P2}}(t)\right)\left(\theta'(t)+\psi'(t)\right)-$$
$$\left.\cos(\alpha(t))\cos(\theta(t)+\psi(t))\left(\eta_6{}'(t)+\eta_7{}'(t)+\eta_8{}'(t)+\eta_9{}'(t)+\eta_{10}{}'(t)+\eta_{\mathrm{P2}}{}'(t)\right)\right)-$$
$$2\cos(\alpha(t))\,\alpha'(t)\left(-\cos(\alpha(t))\left(L_0+\eta_6(t)+\eta_7(t)+\eta_8(t)+\eta_9(t)+\eta_{10}(t)+\eta_{\mathrm{P2}}(t)\right)\alpha'(t)-\right.$$
$$\left.\sin(\alpha(t))\left(\eta_6{}'(t)+\eta_7{}'(t)+\eta_8{}'(t)+\eta_9{}'(t)+\eta_{10}{}'(t)+\eta_{\mathrm{P2}}{}'(t)\right)\right)+$$
$$2\left(\sin(\alpha(t))\sin(\theta(t)+\psi(t))\,\alpha'(t)-\cos(\alpha(t))\cos(\theta(t)+\psi(t))\left(\theta'(t)+\psi'(t)\right)\right)$$
$$\left(\sin(\theta(t))\,R'(t)+\sin(\alpha(t))\sin(\theta(t)+\psi(t))\left(L_0+\eta_6(t)+\eta_7(t)+\eta_8(t)+\eta_9(t)+\eta_{10}(t)+\eta_{\mathrm{P2}}(t)\right)\right.$$
$$\alpha'(t)+\cos(\theta(t))\,R(t)\,\theta'(t)-\cos(\alpha(t))\cos(\theta(t)+\psi(t))$$
$$\left(L_0+\eta_6(t)+\eta_7(t)+\eta_8(t)+\eta_9(t)+\eta_{10}(t)+\eta_{\mathrm{P2}}(t)\right)\left(\theta'(t)+\psi'(t)\right)-$$
$$\left.\left.\cos(\alpha(t))\sin(\theta(t)+\psi(t))\left(\eta_6{}'(t)+\eta_7{}'(t)+\eta_8{}'(t)+\eta_9{}'(t)+\eta_{10}{}'(t)+\eta_{\mathrm{P2}}{}'(t)\right)\right)\right)+$$
$$\frac{1}{2}\,M_{\mathrm{P2}}\left(2\cos(\theta(t)+\psi(t))\sin(\alpha(t))\,\alpha'(t)\left(\cos(\theta(t))\,R'(t)+\cos(\theta(t)+\psi(t))\sin(\alpha(t))\left(L_0+\right.\right.\right.$$
$$\left.\left.\left.\eta_6(t)+\eta_7(t)+\eta_8(t)+\eta_9(t)+\eta_{10}(t)+\eta_{\mathrm{P2}}(t)\right)\alpha'(t)-R(t)\sin(\theta(t))\,\theta'(t)+\cos(\alpha(t))\right.\right.$$
$$\left.\left.\sin(\theta(t)+\psi(t))\left(L_0+\eta_6(t)+\eta_7(t)+\eta_8(t)+\eta_9(t)+\eta_{10}(t)+\eta_{\mathrm{P2}}(t)\right)\left(\theta'(t)+\psi'(t)\right)-\right.\right.$$
$$\left.\left.\cos(\alpha(t))\cos(\theta(t)+\psi(t))\left(\eta_6{}'(t)+\eta_7{}'(t)+\eta_8{}'(t)+\eta_9{}'(t)+\eta_{10}{}'(t)+\eta_{\mathrm{P2}}{}'(t)\right)\right)+\right.$$
$$2\cos(\alpha(t))\sin(\theta(t)+\psi(t))\left(\theta'(t)+\psi'(t)\right)\left(\cos(\theta(t))\,R'(t)+\cos(\theta(t)+\psi(t))\sin(\alpha(t))\left(L_0+\right.\right.$$
$$\left.\left.\eta_6(t)+\eta_7(t)+\eta_8(t)+\eta_9(t)+\eta_{10}(t)+\eta_{\mathrm{P2}}(t)\right)\alpha'(t)-R(t)\sin(\theta(t))\,\theta'(t)+\cos(\alpha(t))\right.$$
$$\left.\sin(\theta(t)+\psi(t))\left(L_0+\eta_6(t)+\eta_7(t)+\eta_8(t)+\eta_9(t)+\eta_{10}(t)+\eta_{\mathrm{P2}}(t)\right)\left(\theta'(t)+\psi'(t)\right)-\right.$$
$$\left.\cos(\alpha(t))\cos(\theta(t)+\psi(t))\left(\eta_6{}'(t)+\eta_7{}'(t)+\eta_8{}'(t)+\eta_9{}'(t)+\eta_{10}{}'(t)+\eta_{\mathrm{P2}}{}'(t)\right)\right)-$$
$$2\cos(\alpha(t))\,\alpha'(t)\left(-\cos(\alpha(t))\left(L_0+\eta_6(t)+\eta_7(t)+\eta_8(t)+\eta_9(t)+\eta_{10}(t)+\eta_{\mathrm{P2}}(t)\right)\alpha'(t)-\right.$$
$$\left.\sin(\alpha(t))\left(\eta_6{}'(t)+\eta_7{}'(t)+\eta_8{}'(t)+\eta_9{}'(t)+\eta_{10}{}'(t)+\eta_{\mathrm{P2}}{}'(t)\right)\right)+$$
$$2\sin(\alpha(t))\sin(\theta(t)+\psi(t))\,\alpha'(t)\left(\sin(\theta(t))\,R'(t)+\sin(\alpha(t))\sin(\theta(t)+\psi(t))\left(L_0+\eta_6(t)+\right.\right.$$
$$\left.\left.\eta_7(t)+\eta_8(t)+\eta_9(t)+\eta_{10}(t)+\eta_{\mathrm{P2}}(t)\right)\alpha'(t)+\cos(\theta(t))\,R(t)\,\theta'(t)-\cos(\alpha(t))\right.$$
$$\left.\cos(\theta(t)+\psi(t))\left(L_0+\eta_6(t)+\eta_7(t)+\eta_8(t)+\eta_9(t)+\eta_{10}(t)+\eta_{\mathrm{P2}}(t)\right)\left(\theta'(t)+\psi'(t)\right)-\right.$$
$$\left.\cos(\alpha(t))\sin(\theta(t)+\psi(t))\left(\eta_6{}'(t)+\eta_7{}'(t)+\eta_8{}'(t)+\eta_9{}'(t)+\eta_{10}{}'(t)+\eta_{\mathrm{P2}}{}'(t)\right)\right)-$$
$$2\cos(\alpha(t))\cos(\theta(t)+\psi(t))\left(\theta'(t)+\psi'(t)\right)\left(\sin(\theta(t))\,R'(t)+\sin(\alpha(t))\sin(\theta(t)+\psi(t))\right.$$
$$\left.\left(L_0+\eta_6(t)+\eta_7(t)+\eta_8(t)+\eta_9(t)+\eta_{10}(t)+\eta_{\mathrm{P2}}(t)\right)\alpha'(t)+\cos(\theta(t))\,R(t)\,\theta'(t)-\right.$$

$$\cos(\alpha(t))\cos(\theta(t)+\psi(t))\left(L_0+\eta_6(t)+\eta_7(t)+\eta_8(t)+\eta_9(t)+\eta_{10}(t)+\eta_{P2}(t)\right)$$
$$\left(\theta'(t)+\psi'(t)\right)-\cos(\alpha(t))\sin(\theta(t)+\psi(t))$$
$$\left(\eta_6'(t)+\eta_7'(t)+\eta_8'(t)+\eta_9'(t)+\eta_{10}'(t)+\eta_{P2}'(t)\right)\Big)-2\cos(\alpha(t))\cos(\theta(t)+\psi(t))$$
$$\Big(\cos(\alpha(t))\cos(\theta(t)+\psi(t))\left(L_0+\eta_6(t)+\eta_7(t)+\eta_8(t)+\eta_9(t)+\eta_{10}(t)+\eta_{P2}(t)\right)\alpha'(t)^2-$$
$$2\sin(\alpha(t))\sin(\theta(t)+\psi(t))\left(L_0+\eta_6(t)+\eta_7(t)+\eta_8(t)+\eta_9(t)+\eta_{10}(t)+\eta_{P2}(t)\right)$$
$$\left(\theta'(t)+\psi'(t)\right)\alpha'(t)+2\cos(\theta(t)+\psi(t))\sin(\alpha(t))$$
$$\left(\eta_6'(t)+\eta_7'(t)+\eta_8'(t)+\eta_9'(t)+\eta_{10}'(t)+\eta_{P2}'(t)\right)\alpha'(t)-\cos(\theta(t))\,R(t)\,\theta'(t)^2+$$
$$\cos(\alpha(t))\cos(\theta(t)+\psi(t))\left(L_0+\eta_6(t)+\eta_7(t)+\eta_8(t)+\eta_9(t)+\eta_{10}(t)+\eta_{P2}(t)\right)$$
$$\left(\theta'(t)+\psi'(t)\right)^2-2\sin(\theta(t))\,R'(t)\,\theta'(t)+2\cos(\alpha(t))\sin(\theta(t)+\psi(t))\left(\theta'(t)+\psi'(t)\right)$$
$$\left(\eta_6'(t)+\eta_7'(t)+\eta_8'(t)+\eta_9'(t)+\eta_{10}'(t)+\eta_{P2}'(t)\right)+\cos(\theta(t))\,R''(t)+$$
$$\cos(\theta(t)+\psi(t))\sin(\alpha(t))\left(L_0+\eta_6(t)+\eta_7(t)+\eta_8(t)+\eta_9(t)+\eta_{10}(t)+\eta_{P2}(t)\right)\alpha''(t)-$$
$$R(t)\sin(\theta(t))\,\theta''(t)+\cos(\alpha(t))\sin(\theta(t)+\psi(t))$$
$$\left(L_0+\eta_6(t)+\eta_7(t)+\eta_8(t)+\eta_9(t)+\eta_{10}(t)+\eta_{P2}(t)\right)\left(\theta''(t)+\psi''(t)\right)-$$
$$\cos(\alpha(t))\cos(\theta(t)+\psi(t))\left(\eta_6''(t)+\eta_7''(t)+\eta_8''(t)+\eta_9''(t)+\eta_{10}''(t)+\eta_{P2}''(t)\right)\Big)-$$
$$2\sin(\alpha(t))\Big(\sin(\alpha(t))\left(L_0+\eta_6(t)+\eta_7(t)+\eta_8(t)+\eta_9(t)+\eta_{10}(t)+\eta_{P2}(t)\right)\alpha'(t)^2-$$
$$2\cos(\alpha(t))\left(\eta_6'(t)+\eta_7'(t)+\eta_8'(t)+\eta_9'(t)+\eta_{10}'(t)+\eta_{P2}'(t)\right)\alpha'(t)-$$
$$\cos(\alpha(t))\left(L_0+\eta_6(t)+\eta_7(t)+\eta_8(t)+\eta_9(t)+\eta_{10}(t)+\eta_{P2}(t)\right)\alpha''(t)-\sin(\alpha(t))$$
$$\left(\eta_6''(t)+\eta_7''(t)+\eta_8''(t)+\eta_9''(t)+\eta_{10}''(t)+\eta_{P2}''(t)\right)\Big)-2\cos(\alpha(t))\sin(\theta(t)+\psi(t))$$
$$\Big(\cos(\alpha(t))\sin(\theta(t)+\psi(t))\left(L_0+\eta_6(t)+\eta_7(t)+\eta_8(t)+\eta_9(t)+\eta_{10}(t)+\eta_{P2}(t)\right)\alpha'(t)^2+$$
$$2\cos(\theta(t)+\psi(t))\sin(\alpha(t))\left(L_0+\eta_6(t)+\eta_7(t)+\eta_8(t)+\eta_9(t)+\eta_{10}(t)+\eta_{P2}(t)\right)$$
$$\left(\theta'(t)+\psi'(t)\right)\alpha'(t)+2\sin(\alpha(t))\sin(\theta(t)+\psi(t))$$
$$\left(\eta_6'(t)+\eta_7'(t)+\eta_8'(t)+\eta_9'(t)+\eta_{10}'(t)+\eta_{P2}'(t)\right)\alpha'(t)-R(t)\sin(\theta(t))\,\theta'(t)^2+$$
$$\cos(\alpha(t))\sin(\theta(t)+\psi(t))\left(L_0+\eta_6(t)+\eta_7(t)+\eta_8(t)+\eta_9(t)+\eta_{10}(t)+\eta_{P2}(t)\right)$$
$$\left(\theta'(t)+\psi'(t)\right)^2+2\cos(\theta(t))\,R'(t)\,\theta'(t)-2\cos(\alpha(t))\cos(\theta(t)+\psi(t))\left(\theta'(t)+\psi'(t)\right)$$
$$\left(\eta_6'(t)+\eta_7'(t)+\eta_8'(t)+\eta_9'(t)+\eta_{10}'(t)+\eta_{P2}'(t)\right)+\sin(\theta(t))\,R''(t)+$$
$$\sin(\alpha(t))\sin(\theta(t)+\psi(t))\left(L_0+\eta_6(t)+\eta_7(t)+\eta_8(t)+\eta_9(t)+\eta_{10}(t)+\eta_{P2}(t)\right)\alpha''(t)+$$
$$\cos(\theta(t))\,R(t)\,\theta''(t)-\cos(\alpha(t))\cos(\theta(t)+\psi(t))$$
$$\left(L_0+\eta_6(t)+\eta_7(t)+\eta_8(t)+\eta_9(t)+\eta_{10}(t)+\eta_{P2}(t)\right)\left(\theta''(t)+\psi''(t)\right)-$$
$$\cos(\alpha(t))\sin(\theta(t)+\psi(t))\left(\eta_6''(t)+\eta_7''(t)+\eta_8''(t)+\eta_9''(t)+\eta_{10}''(t)+\eta_{P2}''(t)\right)\Big)\Big)+$$
$$\Big(\mu\,M_{P2}\Big(2\left(L_0+\eta_6(t)+\eta_7(t)+\eta_8(t)+\eta_9(t)+\eta_{10}(t)+\eta_{P2}(t)\right)\sin^2(\alpha(t))-$$
$$2\cos(\alpha(t))\cos(\theta(t)+\psi(t))\Big(\cos(\theta(t))\,R(t)-$$
$$\cos(\alpha(t))\cos(\theta(t)+\psi(t))\left(L_0+\eta_6(t)+\eta_7(t)+\eta_8(t)+\eta_9(t)+\eta_{10}(t)+\eta_{P2}(t)\right)\Big)-$$
$$2\cos(\alpha(t))\sin(\theta(t)+\psi(t))\left(R(t)\sin(\theta(t))-\cos(\alpha(t))\sin(\theta(t)+\psi(t))\right)$$

$$\left(L_0 + \eta_6(t) + \eta_7(t) + \eta_8(t) + \eta_9(t) + \eta_{10}(t) + \eta_{P2}(t)\right)\Big)\Big)\Big/$$
$$\Big(2\Big(\sin^2(\alpha(t))\left(L_0 + \eta_6(t) + \eta_7(t) + \eta_8(t) + \eta_9(t) + \eta_{10}(t) + \eta_{P2}(t)\right)^2 + \left(\cos(\theta(t))\, R(t) -$$
$$\cos(\alpha(t))\cos(\theta(t) + \psi(t))\left(L_0 + \eta_6(t) + \eta_7(t) + \eta_8(t) + \eta_9(t) + \eta_{10}(t) + \eta_{P2}(t)\right)\right)^2 +$$
$$\left(R(t)\sin(\theta(t)) - \cos(\alpha(t))\sin(\theta(t) + \psi(t))\left(L_0 + \eta_6(t) + \eta_7(t) + \eta_8(t) +\right.\right.$$
$$\left.\left.\eta_9(t) + \eta_{10}(t) + \eta_{P2}(t)\right)\right)^2\Big)^{3/2}\Big) = -c_0\left(\dot{\eta}_{10} - \dot{\eta}_{P2}\right)$$