$$2\ \mathrm{Re}\ \underline{\hat{\varrho}}_w\,(x) = \ \mathrm{Re\ tr}\ \left(T_u\left(\tilde{\gamma}_w\right) - \lambda_w\right) + \frac{\underline{\mathcal{L}}_u\,(x)\left(\hat{\gamma}_w\,(x) - x\cdot\lambda_w\right)}{\mathcal{L}_u\,(x)}$$

$$\mathrm{LHS}\ = \partial_t^0\,\overbrace{\hat{\varrho}_{g_t}\,(x)}^{2} = \partial_t^0\,\overbrace{\det h_t^{-1} T_u\left(\tilde{g}_t\right)}\frac{\mathcal{L}_u\left(h_t^{-1}\hat{g}_t\cdot x\right)}{\mathcal{L}_u\,(x)} = \ \mathrm{RHS}$$

$$\mathrm{Re\ tr}\ \left(\lambda_w - {}^u\underline{\tilde{\gamma}}_w\right) = c\,(w|u + u|w)$$

$$\hat{\gamma}_w\,(x) - x\cdot\,\lambda_w\ = x\,\overset{*}{\underline{u}}\,\overbrace{w_1 + \overset{*}{w}_1}$$

$$2\ \mathrm{Re}\ \underline{\hat{\varrho}}_w\,(x) = c\,(w|u + u|w) + \frac{\underline{\mathcal{L}}_u\,(x)}{\mathcal{L}_u\,(x)}x\,\overset{*}{\underline{u}}\,\overbrace{w_1 + \overset{*}{w}_1}$$

$$\mathcal{L}\,(h\cdot u|h\cdot x) = \mathcal{L}\,(u|x)$$

$$\varrho_1\,\mathcal{L}\,(u|x)\,Au + \varrho_2\,\mathcal{L}\,(u|x)\,Ax = 0$$

$$\mathcal{L}_u\,(x)\ \underline{\hat{\varrho}}_w\,(x) = \frac{1}{2}\mathrm{Re\ tr}_{i_uX}\,T_u\left(\tilde{\gamma}_w\right) + \ \mathrm{Tr}_{Z_u^{1/2}}\,T_u\,\underline{\tilde{\gamma}}_w + \varrho_1\,\mathcal{L}\,(u|x)\ \tilde{\gamma}_w\,\cdot u + \varrho_2\,\mathcal{L}\,(u|x)\ \hat{\gamma}_w\,\cdot x$$

$$\varrho_1\,\mathcal{L}\,(u|x)\ \tilde{\gamma}_w\,\cdot u = \varrho_1\,\mathcal{L}\,(u|x)\left(w_1 - w_1^* + w_{\ 1/2}\right) = \varrho_1\,\mathcal{L}\,(u|x)\ w_{\ 1/2} + \varrho_2\,\mathcal{L}\,(u|x)\left(w_1^* - w_1\right)$$

$$\varrho_2\,\mathcal{L}\,(u|x)\ \hat{\gamma}_w\,\cdot x = 2\,\varrho_2\,\mathcal{L}\,(u|x)\,w\,\overset{*}{\underline{u}}\,x$$

$$\mathcal{L}_u\,(x)\ \underline{\hat{\varrho}}_\gamma\,(x) = \frac{1}{2}\mathrm{Re\ tr}_{i_uX}\,T_u\,(\tilde{\gamma}) + \ \mathrm{Tr}_{Z_u^{1/2}}\,T_u\,\underline{\tilde{\gamma}} + \varrho_1\,\mathcal{L}\,(u|x)\ \tilde{\gamma}\,\cdot u + \varrho_2\,\mathcal{L}\,(u|x)\ \hat{\gamma}\,\cdot x$$