Hermite–Padé approximant of $[1, f, g]$*,* $m = 2$
Zero coefficient:

$$\vec{A}_3^{[0]} = (0, 1, a_1^{[0]})$$

First coefficient:

$$\vec{A}_2^{[1]} = (a_2^{[1]}, a_2^{[1]} a_1^{[0]}, z)$$
$$\vec{A}_3^{[1]} = (1, a_1^{[1]} + a_2^{[0]}, a_1^{[1]} a_1^{[0]})$$

Second coefficient:

$$\vec{A}_2^{[2]} = a_2^{[2]} \vec{A}_2^{[1]} + z\vec{A}_3^{[0]}$$
$$\vec{A}_3^{[2]} = a_1^{[2]} \vec{A}_3^{[1]} + \vec{A}_2^{[1]}$$

Third coefficient:

$$\vec{A}_2^{[3]} = a_2^{[3]} \vec{A}_2^{[2]} + z\vec{A}_3^{[1]}$$
$$\vec{A}_3^{[3]} = a_1^{[3]} \vec{A}_3^{[2]} + \vec{A}_2^{[2]}$$

Hermite-Padé approximant of $[1, f, g, h]$*,* $m = 3$
Zero coefficient:

$$\vec{A}_4^{[0]} = (0, 0, 1, a_1^{[0]})$$

First coefficient:

$$\vec{A}_2^{[1]} = (a_3^{[1]}, a_3^{[1]} a_3^{[0]}, 0, z)$$
$$\vec{A}_3^{[1]} = (1, a_2^{[1]} + a_3^{[0]}, a_2^{[1]} a_2^{[0]}, 0)$$
$$\vec{A}_4^{[1]} = (0, 1, a_1^{[1]} + a_2^{[0]}, a_1^{[1]} a_1^{[0]})$$

Second coefficient:

$$\vec{A}_2^{[2]} = a_3^{[2]} \vec{A}_2^{[1]} + z\vec{A}_4^{[0]}$$
$$\vec{A}_3^{[2]} = a_2^{[2]} \vec{A}_3^{[1]} + \vec{A}_2^{[1]}$$
$$\vec{A}_4^{[2]} = a_1^{[2]} \vec{A}_4^{[1]} + \vec{A}_3^{[1]}$$

Third coefficient:

$$\vec{A}_2^{[3]} = a_3^{[3]} \vec{A}_2^{[2]} + z\vec{A}_4^{[1]}$$
$$\vec{A}_3^{[3]} = a_2^{[3]} \vec{A}_3^{[2]} + \vec{A}_2^{[2]}$$
$$\vec{A}_4^{[3]} = a_1^{[3]} \vec{A}_4^{[2]} + \vec{A}_3^{[2]}$$