

M = 2, n = 4:

Original equation:

$$\begin{aligned}
& +15f_{-1}^4f_0^2 + 6f_{-1}^5f_1 + 60f_{-2}f_{-1}^2f_0^3 + 120f_{-2}f_{-1}^3f_0f_1 + 30f_{-2}f_{-1}^4f_2 \\
& + 15f_{-2}^2f_0^4 + 180f_{-2}^2f_{-1}f_0^2f_1 + 90f_{-2}^2f_{-1}^2f_1^2 + 180f_{-2}^2f_{-1}^2f_0f_2 \\
& + 60f_{-2}^3f_0f_1^2 + 60f_{-2}^3f_0^2f_2 + 120f_{-2}^3f_{-1}f_1f_2 + 15f_{-2}^4f_2^2 = 0
\end{aligned} \tag{1}$$

Simplified equation, where $f_{-j} = \overline{f_j}$:

$$\begin{aligned}
& 15f_0^4\overline{f_2}^2 + 60f_0^3\overline{f_1}^2\overline{f_2} + 180f_0^2f_1\overline{f_1f_2}^2 + 60f_0^2f_2\overline{f_2}^3 + 15f_0^2\overline{f_1}^4 \\
& + 60f_0f_1^2\overline{f_2}^3 + 120f_0f_1\overline{f_1}^3\overline{f_2} + 180f_0f_2\overline{f_1}^2\overline{f_2}^2 + 90f_1^2\overline{f_1}^2\overline{f_2}^2 \\
& + 120f_1f_2f_1\overline{f_2}^3 + 6f_1\overline{f_1}^5 + 15f_2^2\overline{f_2}^4 + 30f_2f_1^4\overline{f_2} = 0
\end{aligned} \tag{2}$$

All possible solutions:

$$(0, \quad 0) \tag{3}$$