M = 2, n = 5:

Original equation:

$$\begin{aligned}&+21f_{-1}^5f_0^2+7f_{-1}^6f_1+140f_{-2}f_{-1}^3f_0^3+210f_{-2}f_{-1}^4f_0f_1+42f_{-2}f_{-1}^5f_2\\&+105f_{-2}^2f_{-1}f_0^4+630f_{-2}^2f_{-1}^2f_0^2f_1+210f_{-2}^2f_{-1}^3f_1^2+420f_{-2}^2f_{-1}^3f_0f_2\\&+140f_{-2}^3f_0^3f_1+420f_{-2}^3f_{-1}f_0f_1^2+420f_{-2}^3f_{-1}f_0^2f_2\\&+420f_{-2}^3f_{-1}^2f_1f_2+35f_{-2}^4f_1^3+210f_{-2}^4f_0f_1f_2+105f_{-2}^4f_{-1}f_2^2=0\end{aligned}\tag{1}$$

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

$$\begin{aligned}&105f_0^4\overline{f_1f_2}^2+140f_0^3f_1\overline{f_2}^3+140f_0^3\overline{f_1}^3\overline{f_2}+630f_0^2f_1\overline{f_1}^2\overline{f_2}^2\\&+420f_0^2f_2\overline{f_1f_2}^3+21f_0^2\overline{f_1}^5+420f_0f_1^2\overline{f_1f_2}^3+210f_0f_1f_2\overline{f_2}^4\\&+210f_0f_1\overline{f_1}^4\overline{f_2}+420f_0f_2\overline{f_1}^3\overline{f_2}^2+35f_1^3\overline{f_2}^4+210f_1^2\overline{f_1}^3\overline{f_2}^2\\&+420f_1f_2\overline{f_1}^2\overline{f_2}^3+7f_1\overline{f_1}^6+105f_2^2\overline{f_1f_2}^4+42f_2\overline{f_1}^5\overline{f_2}=0\end{aligned}\tag{2}$$

All possible solutions:

$$\{f_1:0\}\tag{3}$$

$$\{f_1:0,\quad f_2:0\}\tag{4}$$