A Note on the Entire Solutions for the System of Partial Differential-Difference Equations of Fermat-Type

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Abstract. The present study focuses to find out a result for the existence and different forms of entire solutions of Fermat-type for the system of partial differential-difference equations:

\[
\begin{align*}
\left[ \frac{\partial f_1(z_1,z_2)}{\partial z_1} + \frac{\partial f_1(z_1,z_2)}{\partial z_2} \right]^2 + f_2(z_1 + c_1, z_2 + c_2)^2 &= e^{g(z_1,z_2)}, \\
\left[ \frac{\partial f_2(z_1,z_2)}{\partial z_1} + \frac{\partial f_2(z_1,z_2)}{\partial z_2} \right]^2 + f_1(z_1 + c_1, z_2 + c_2)^2 &= e^{g(z_1,z_2)}, \\
\left[ \frac{\partial f_1(z_1,z_2)}{\partial z_1} + \frac{\partial f_1(z_1,z_2)}{\partial z_2} \right]^2 + \left[ f_2(z_1 + c_1, z_2 + c_2) - f_1(z_1, z_2) \right]^2 &= e^{g(z_1,z_2)}, \\
\left[ \frac{\partial f_2(z_1,z_2)}{\partial z_1} + \frac{\partial f_2(z_1,z_2)}{\partial z_2} \right]^2 + \left[ f_1(z_1 + c_1, z_2 + c_2) - f_2(z_1, z_2) \right]^2 &= e^{g(z_1,z_2)}
\end{align*}
\]

and

\[
\left( \frac{\partial^2 f(z_1,z_2)}{\partial z_1 \partial z_2} \right)^n + f(z_1 + c_1, z_2 + c_2)^m = e^{g(z_1,z_2)}.
\]

Our enquiry attempt to generalize and extend the result of H. Y. Xu, et al., [20] to the system of equations.