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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:

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

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

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.

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