ON THE EXISTENCE AND UNIQUENESS OF SOLUTIONS OF A CERTAIN CLASS OF NON-LINEAR SINGULAR INTEGRAL EQUATIONS

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Abstract

In this study, the existence of a solution of the non-linear singular integral equation system

\[ w(z) = f_1(z, w(z), h(z), T_Gg_1(\cdot, w(\cdot), h(\cdot))(z)), \]
\[ h(z) = f_2(z, w(z), h(z), T_Gg_2(\cdot, w(\cdot), h(\cdot))(z)), \]

has been investigated. This system is more general than the one

\[ w(z) = f_1(z, w(z), h(z), T_Gg_1(\cdot, w(\cdot), h(\cdot))(z)), \]
\[ h(z) = f_2(z, w(z), h(z), \Pi_Gg_2(\cdot, w(\cdot), h(\cdot))(z)), \]

studied by Musayev and Düz (Existence and uniqueness theorems for a certain class of non linear singular integral equations SJAM 10 (1), 3–18, 2009). Here, \( T_Gf(z) \) and \( \Pi_Gf(z) \) are the Vekua integral operators defined by

\[ T_Gf(z) = -\frac{1}{\pi} \int_G \frac{f(\varsigma)}{\varsigma - z} d\varsigma d\eta, \]
\[ \Pi_Gf(z) = -\frac{1}{\pi} \int_G \frac{f(\varsigma)}{(\varsigma - z)^2} d\varsigma d\eta. \]

Keywords: Singular integral equations, Holder continuity, Fixed point theorem, Contraction mapping.

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