ON BEST PROXIMITY PAIRS WITH APPLICATION TO DIFFERENTIAL EQUATIONS

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Abstract. In this paper we consider the following system of differential equations,

\[ y' = f(x,y), \quad y(x_0) = y_1 \quad \text{and} \quad z' = g(x,z), \quad z(x_0) = z_1, \]

where \( f, g \) are bounded \( L^1 \) functions defined on a rectangle in \( \mathbb{R}^2 \). We give sufficient conditions for the existence of two functions \( \phi \) and \( \psi \), on an interval \( I \) containing \( x_0 \), such that

\[ |y_1 + \int_{x_0}^{x} f(t, \phi(t))dt - \phi(x)| \leq |y_1 - z_1|, \]
\[ |z_1 + \int_{x_0}^{x} g(t, \psi(t))dt - \psi(x)| \leq |y_1 - z_1| \]

for all \( x \in I \). To establish the same, we introduce a notation of c-cyclic contractive mapping and prove the existence of best proximity pairs for such a mapping.

Key Words and Phrases: Contraction, best proximity points, system of differential equations.

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