South East Asian J. of Math. & Math. Sci. **ISSN : 0972-7752**
Vol.12, No.2 2016, pp. 125-136

EULER-DARBOUX EQUATION ASSOCIATED WITH EXPONENTIAL FUNCTION OF CONVOLUTION TYPE-II

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Dedicated to Prof. A.M. Mathai on his 80^{th} ***birth anniversary***

Abstract: In this paper, authors have established new and interesting results of Euler-Darboux equations associated with exponential functions of convolution type-II.

Key words and Phrases: Euler-Darboux equation, fractional integral operator, Gauss hypergeometric function, Holder continuity.

2010 Mathematics Subject Classification: 26A33, 45E05.

1. Introduction

The paper is devoted to solve a boundary value problem for the Euler-Darboux equation

$$u_{xy} - (\beta u_x - \alpha u_y)/(x-y) = 0 \quad (\alpha > 0, \beta > 0, \alpha + \beta < 1)$$

in the domain $[(x,y)|0 < x < y < 1]$ by reducing it to a dominant singular integral with Cauchy kernel. Boundary conditions are $u(x,x) = \varphi_1(x)$ and $AI_{ox}^{a,b,-\alpha+\beta-1}u(o,x) + BJ_{x1}^{a+\alpha-\beta,c,-\alpha+\beta-1} = \varphi_2(x)$, where I and J stand for generalized fractional integral operators. In the recent paper Gaur, V.K. and Bajpai, U.K. (2008), there has been discussed a generalized Goursat problem for the Euler-Darboux equation.

$$\frac{\partial^2 u}{\partial x \partial y} - \frac{\beta}{\exp x - \exp y}\frac{\partial u}{\partial y} + \frac{\alpha}{\exp x - \exp y}\frac{\partial u}{\partial y} = 0 \tag{1.1}$$

By using the generalized fractional calculus Saigo, M. (1978, 80). Similar work on fractional operators did time to time by eminent mathematicians like Saxena