KYUNGPOOK Math. J. 56(2016), 465-471
http://dx.doi.org/10.5666/KMJ.2016.56.2.465
pISSN 1225-6951 eISSN 0454-8124

Some Finite Integrals Involving Srivastava's Polynomials and the Aleph Function

Alok Bhargava*
Department of Mathematics, Jaipur Engineering College and Research Centre, Jaipur(Raj.), India
e-mail : alokbhargava2003@yahoo.co.in

Amber Srivastava and Rohit Mukherjee
Department of Mathematics, Swami Keshvanand Institute of Technology,Management and Gramothan, Jaipur(Raj.), India
e-mail : prof.amber@gmail.com *and* rohit@skit.ac.in

Abstract. In this paper, we establish certain integrals involving Srivastava's Polynomials [5] and Aleph Function ([8], [10]). On account of general nature of the functions and polynomials involved in the integrals, our results provide interesting unifications and generalizations of a large number of new and known results, which may find useful applications in the field of science and engineering. To illustrate, we have recorded some special cases of our main results which are also sufficiently general and unified in nature and are of interest in themselves.

1. Introduction

The Aleph function, introduced by Südland et al. ([8]; see also [10]), is defined in terms of Mellin Barnes type integrals as:

$$\aleph\left[z\right] = \aleph^{m,n}_{p_i,q_i,\tau_i;r}\left\{ z \;\middle|\; \begin{matrix} (a_j, A_j)_{1,n}; [\tau_i\,(a_{ji}, A_{ji})]_{n+1,p_i;r} \\ (b_j, B_j)_{1,m}; [\tau_i\,(b_{ji}, B_{ji})]_{m+1,q_i;r} \end{matrix} \right\}$$

$$= \frac{1}{2\pi\omega}\int_L \Omega^{m,n}_{p_i,q_i,\tau_i;r}(s) z^{-s} ds \tag{1.1}$$

* Corresponding Author.
Received August 2, 2014; revised March 5, 2015; accepted November 3, 2015.
2010 Mathematics Subject Classification: 33C45, 33C60.
Key words and phrases: Aleph Function, Srivastava's Polynomials, Jacobi Polynomials.

Proc. Natl. Acad. Sci., India, Sect. A Phys. Sci.
DOI 10.1007/s40010-016-0319-4

RESEARCH ARTICLE

On a Mathematical Model Involving I-Function for Studying the Effect of Environmental Pollution

Alok Bhargava[1] · **Amber Srivastava**[2] · **Rohit Mukherjee**[2]

Received: 6 October 2014 / Revised: 22 May 2016 / Accepted: 14 November 2016

Abstract In this paper an attempt has been made to study the effect of environmental pollution on the growth and existence of biological populations by presenting a mathematical model involving Saxena's I-Function (Saxena in The I-function. Anamaya Publishers, New Delhi, 2007). It is shown here that the habitat still remains asymptotically stable but at much reduced levels implying that if the concentration of pollutant continues to increase in the environment unabatedly, the species may not exist for long. The results established in this paper are general in nature and yield numerous cases of interest on suitable specifications of parameters involved therein.

Keywords I-Function · Non-linear partial differential equation · Environmental pollution

Mathematics Subject Classification 33C45 · 33C60

✉ Alok Bhargava
alokbhargava2003@yahoo.co.in

Amber Srivastava
prof.amber@gmail.com

Rohit Mukherjee
rohit@skit.ac.in

[1] Department of Mathematics, Jaipur Engineering College and Research Centre, Jaipur, Rajasthan, India

[2] Department of Mathematics, Swami Keshvanand Institute of Technology, Management & Gramothan, Jaipur, Rajasthan 302017, India

1 Introduction

Environmental pollution is a worldwide problem, having a great potential to influence not only the physiology of human population but also causing grave and irreparable damage to the earth. A lot of research work has been carried out pertaining to the adverse effects of environmental pollution and factors by several researchers [1–3]. Environmental Pollution is the contamination of the physical and biological components of the earth/atmosphere to such an extent that normal environmental processes are adversely affected [4–6].

The biological and ecological consequences of pollution in our environment may be considered in several ways depending upon the toxic level of pollutants (acute or chronic) and the ecotoxicological situations. One such situation is where the pollutants can adversely affect the natural resources, thereby influencing the growth of other biological populations which may be depending upon these resources. Another such situation is where the pollutants can affect directly the species accompanied by rapid injury to the principal physiological and biochemical systems of the organism. This results in lethal toxication, elimination of individual species and populations or causes profound pathological alterations on the level of individual organisms, individual populations, and occasionally on entire ecosystems which might change the carrying capacity of the environment [7–12]. Various investigations have also been carried out in this direction, both experimentally and mathematically [9–11, 13–15]. The deleterious effect of environmental pollution on interacting biological populations depends upon the toxicity and the level of pollutant, the sort of damage it causes to the physiological and biochemical systems of the populations and their environment.

In light of the above discussion, in this paper, we have studied the effect of environmental pollution on the growth

Published online: 24 November 2016