SELECTED TOPICS

In Aerospace Engineering

EDITOR

ERWIN SULAEMAN

IIUM Press

INTERNATIONAL ISLAMIC UNIVERSITY MALAYSIA

SELECTED TOPICS In Aerospace Engineering

EDITOR

ERWIN SULAEMAN

IIUM Press

Published by:
IIUM Press
International Islamic University Malaysia

First Edition, 2011

Perpustakaan Negara Malaysia Cataloguing-in-Publication Data

ISBN: 978-967-418-145-1

Member of Majlis Penerbitan Ilmiah Malaysia – MAPIM
(Malaysian Scholarly Publishing Council)

Printed by :
IIUM PRINTING SDN.BHD.
No. 1, Jalan Industri Batu Caves 1/3
Taman Perindustrian Batu Caves
Batu Caves Centre Point
68100 Batu Caves
Selangor Darul Ehsan
Tel: +603-6188 1542 / 44 / 45 Fax: +603-6188 1543
EMAIL: iiumprinting@yahoo.com

TABLE OF CONTENT

CHAPTER SIXTEEN

FORMULATION OF KERNEL FUNCTION FOR AERODYNAMIC LOADING ON AIR VEHICLE

CHAPTER SEVENTEEN

UNSTEADY AERODYNAMIC THEORY OF LIFTING SURFACE

CHAPTER EIGHTEEN

NUMERICAL EVALUATIONS OF HYPERGEOMETRIC CYLINDRICAL FUNCTIONS

CHAPTER TWENTY THREE

ALTERNATE APPROXIMATE FUNCTION FOR KERNEL FUNCTION OF PLANAR OSCILLATING LIFTING SURFACES

CHAPTER TWENTY FOUR

APPROXIMATE FUNCTION FOR NEAR-FIELD KERNEL FUNCTION OF NON-PLANAR LIFTING SURFACES

CHAPTER TWENTY FIVE

APPROXIMATE FUNCTION FOR FAR-FIELD KERNEL FUNCTION OF OSCILLATING NON-PLANAR LIFTING SURFACES

CHAPTER TWENTY ONE

ALTERNATE EXPANSION SERIES FOR THE INCOMPLETE CYLINDRICAL FUNCTION

21.1. Introduction

This chapter describes an alternate expansion series as an analytical solution to the incomplete cylindrical function. The present alternate series exposes separation between singular and regular functions occurring in the kernel function. This work presents a summary of [34] and its further improvement in [35].

21.2. Separation of Real and Imaginary Functions

It has been described in Chapter 29 that the analytical solution to the incomplete cylindrical function of order n has been given by Ueda [37] as follows:

$$B_v = B_{v,real} + i\, B_{v,imag} \tag{21.1}$$

where

$$B_{v,real} = \sum_{n=0}^{\infty} (-1)^n\, U_{v,2n} + \frac{(-k^2/2)^v}{(2v-1)!!} \sum_{n=0}^{\infty} p_n \frac{(kr/2)^{2n}}{n!\,(n+v)!}$$

$$B_{v,imag} = \sum_{n=0}^{\infty} (-1)^n\, U_{v,2n+1} - \frac{\pi}{2} \frac{(-k^2/2)^v}{(2v-1)!!} \sum_{n=0}^{\infty} \frac{(kr/2)^{2n}}{n!\,(n+v)!} \tag{21.2}$$

$$p_n = -\left(\gamma + \ln\frac{k}{2}\right) + \sum_{m=1}^{n} \frac{1}{m} + \sum_{m=n+1}^{n+v} \frac{1}{2m}$$

and the recursive term U_m is defined in Eq. (21.17).