SELECTED TOPICS

In Aerospace Engineering

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IIUM Press

INTERNATIONAL ISLAMIC UNIVERSITY MALAYSIA

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22.1. Introduction

Evaluation of complicated function, such as the hypergeometric trancendental functions presented in the previous chapters, usually performed by using Taylor's or Maclaurin expansion series. In the present approach, a new procedure of expansion series is introduced. The present expansion series is based on a minimum square error between the continuous, target function and the polynomial approximation functions. The coefficients of the polynomial functions are derived using analytical integration of the square error to achieve the minimum deviation error. Application of the present approach to solve the incomplete cylindrical function and comparison with other methods is shown.

22.2. Taylor and Maclaurin expansion series

To evaluate the value of a function $F(x)$, in many situations, does not need an exact result. For example, to solve the incomplete cylindrical function presented in previous chapters, evaluation of the exponential function $F(x) = e^{ax}$ does not need to be in exact formulation since a further integration of $F(x)$ is difficult to perform. To a certain extent, it may be quite sufficient to use approximate formula. One way to approximate the function in the neighborhood of $x = x_o$ is by using the Taylor expansion series. The standard formula for the Taylor series expansion about the point $x = x_o$ of a function $F(x)$ is as follows: