

Power Series

Mathematical Methods in the Physical Sciences

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Quantitative Methods of Systems Engineering

Introduction

Interval of Convergence

Theorems About Power Series

Expanding Functions in Power Series

Techniques for Obtaining Power Series Expansions

We outlay and demonstrate several methods of obtaining power series expansions.

- Multiplying a series by polynomial or by another series
- Division of two series or of a series by a polynomial
- Binomial series
- Substitution of a polynomial or series or the variable in another series
- Combination of methods
- Taylor series using the basic Maclaurin series
- Using a computer

Techniques for Obtaining Power Series Expansions

Multiplying a Series by a Polynomial or by Another Series

Techniques for Obtaining Power Series Expansions

Division of Two Series or of a Series by a Polynomial

Techniques for Obtaining Power Series Expansions

Binomial Series

Techniques for Obtaining Power Series Expansions

Substitution of a Polynomial or a Series for the Variable in Another Series

Techniques for Obtaining Power Series Expansions

Combination of Methods

Techniques for Obtaining Power Series Expansions

Taylor Series Using the Basic Maclaurin Series

The Maclaurin series provides us with an alternative method to the formulas for obtaining a Taylor series.

Maclaurin Series

$$\ln x = \ln [1 + (x - 1)]$$

Then we replace x with $(x - 1)$

Substitution

$$\begin{aligned}\ln x &= \ln [1 + (x - 1)] \\ &= (x - 1) - \frac{1}{2}(x - 1)^2 + \frac{1}{3}(x - 1)^3 - \frac{1}{4}(x - 1)^4 \dots\end{aligned}$$

Techniques for Obtaining Power Series Expansions

Using a Computer

Accuracy of Series Approximations

Some Uses of Series

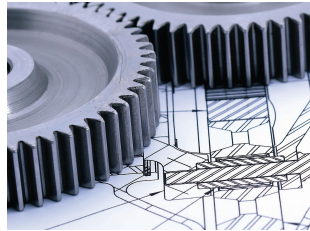
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Example of columns 2

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