Abstract of the bachelor thesis

Fourier series

This thesis aims to present the Fourier series expansion of the real variable function, the synthesis and the demonstration of some convergence and divergence theorems, and some suggestive applications solved by using Fourier series.

The work is divided in four chapters. The first chapter describes the notion of *Fourier series*, orthogonality relations for sines and cosines on which these are based, with the focus being on the expansion of a real function into Fourier series.

The second chapter is dedicated to enunciation and demonstration of some important results (Theorem 2.3.1, Weierstrass Approximation Theorem, Equality of Parseval, Dirichlet's Criterion) that specifies the convergence of the Fourier series of a periodic function.

In parallel to the previous chapter, the third chapter is meant to emphasize the phenomena of divergence of the Fourier series. The last chapter presents the solutions of some solved applications using Fourier series (Applications with reference to heat conduction, vibrating strings, Laplace's equation, Riemann's Zeta function).

My contribution in attaining this thesis consists of: the selection of the bibliographic material and its structure, more detailed presentation of some proofs and some solved applications presented in the last chapter of the paper (Apps 4.0.6 and 4.0.7).

This work is the result of my own activity.

Moldovan Ioana