

# THE FIRST, THE SECOND, AND THE THIRD LIOUVILLE FORMULA AND PERIODICAL SOLUTIONS OF LINEAR DIFFERENTIAL EQUATION OF THE SECOND ORDER

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*(Received December 04, 2006)*

**Abstract.** In this paper, the need for reviving the classical theory of Liouville is emphasized, in order to determine only periodical solutions of linear differential equations this time.

This problem, being one of the most important problems in the practice of differential equations (Mechanics, Mechanical engineering, Electronics) due to fast and in a way impulsive development of these sciences, has not been sufficiently systematically solved.

## 1. HISTORICAL AND TERMINOLOGICAL INTRODUCTION

There are formulae in the theory of linear differential equation connecting any (unknown) particular integral with a known particular integral, and the coefficients of the equation. Those formulae are of the following type

$$y_i = y_k \int f_i \left( y_j e^{\int a_1(x)}; \dots; y_k e^{\int a_n(x)} \right) dx$$

















