

**A few remarks on Euler and Bernoulli polynomials  
and their connections  
with binomial coefficients and modified Pascal matrices**

**Paweł J. Szablowski**

Department of Mathematics and Information Sciences,  
Warsaw University of Technology  
ul Koszykowa 75, 00-662 Warsaw  
Poland

**Abstract**

We prove certain identities involving Euler and Bernoulli polynomials that can be treated as recurrences. We use these and also other known identities to indicate strong connection between Euler and Bernoulli numbers and entries of inverses of certain lower triangular matrices built of binomial coefficients. In other words we interpret Euler and Bernoulli numbers in terms of modified Pascal matrices.

**Mathematics Subject Classification:** Primary 11B68, 11B65; Secondary 11B37, 15B36

**Keywords:** Euler polynomials, Bernoulli polynomials, Binomial Coefficients, Pascal matrices

## **1 Introduction and notation**

The aim of the paper is to indicate close relationship between Euler and Bernoulli polynomials and certain lower triangular matrices with entries depending on binomial coefficients and some other natural numbers. In this way we point out new interpretation of Euler and Bernoulli numbers.

In the series of papers [2], [3], [5], [4] Zhang, Kim and their associates have studied various generalizations of Pascal matrices and examined their properties. The results of this paper can be interpreted as the next step in studying properties of various modifications of Pascal matrices.