



ISSN: 1889-3066

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Web site: [jja.ujaen.es](http://jja.ujaen.es)

Jaen J. Approx. 6(2) (2014), 199–217

**Jaen Journal**  
**on Approximation**

# A new family of multivariate matrix Padé approximants

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## Abstract

Padé-type approximants and Padé approximants are methods of rational approximation of a function which have a formal power series expansion. Padé and Padé-type approximants in the scalar case have been studied in many papers during a number of decades, [4, 6, 8, 9] to cite just a few. A generalization in the rectangular or homogeneous multivariate matrix case was given by Cheng De Zheng and Huaguang Zhang in [14, 15]. In the present work we propose a more general definition of the Padé-type approximants and we will discuss their several algebraic properties which will be established. We introduce a new family of homogeneous multivariate matrix Padé approximants. Numerical examples are given to illustrate our results.

**Keywords:** Padé-type approximants, homogeneous Padé approximants, matrix Padé, multivariate.

**MSC:** Primary 41A21; Secondary 41A20.

## §1. Introduction

The matrix Padé approximants has been studied for a long time by several authors [7, 8, 13, 14, 15]. These approximants are used extensively in many fields: dynamic system control, multiport network synthesis, design of multi-input and multi-output digital filters, reduction of a high degree multivariable system.

**Communicated by**  
K. Kopotun

**Received**  
October 2, 2013  
**Accepted**  
February 25, 2014