# SOME RELATIONS SATISFIED BY ORTHOGONAL MATRIX POLYNOMIALS

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**Abstract**

The main purpose of this paper is to obtain some properties of orthogonal matrix polynomials. We derive identities for power series satisfied by Laguerre, Hermite and Gegenbauer matrix polynomials. Furthermore, for these matrix polynomials, we give raising operators.

**Keywords:** Laguerre matrix polynomials, Hermite matrix polynomials, Gegenbauer matrix polynomials, Power series, Raising operator.

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## 1. Introduction

"Orthogonal matrix polynomials" is a developing field whose development is attaining significant results from both the theoretical and practical examples. The property of orthogonality [9, 10], Rodrigues formula [3, 5], a second-order Sturm-Liouville differential equation [3], a three-term matrix recurrence [5, 6], a relation between different orthogonal matrix polynomials [17] are theoretical examples for orthogonal matrix polynomials. Beside, practical examples for matrix polynomials can be seen in statistics, group representation theory [12], scattering theory [11], differential equations [14, 15], Fourier series expansions [4], interpolation and quadrature [19, 20], splines [7] and medical imaging [2].

Some results in the theory of classical orthogonal polynomials have been extended to orthogonal matrix polynomials, see [1, 5, 13, 14, 16]. In [18], these matrix polynomials are orthogonal as examples of right orthogonal matrix polynomial sequences for appropriate right matrix moment functionals of integral type. Hermite, Laguerre and Gegenbauer matrix polynomials have been introduced and studied in [13, 14, 15] for matrices in $\mathbb{C}^{r \times r}$.

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