

# **Bi-infinite Riordan matrices: A matricial approach to multiplication and composition of formal Laurent series**

L.F. Prieto Martínez; J. Rico Cabrera

## **Abstract-**

**We propose and investigate a bi-infinite matrix approach to the multiplication and composition of formal Laurent series. We generalize the concept of Riordan matrix to this bi-infinite context, obtaining matrices that are not necessarily lower triangular and are determined, not by a pair of formal power series, but by a pair of formal Laurent series. We extend the First Fundamental Theorem of Riordan Matrices to this setting, as well as the Toeplitz and Lagrange subgroups, that are subgroups of the classical Riordan group. Finally, as an illustrative example, we apply our approach to derive a classical combinatorial identity that cannot be proved using the techniques related to the classical Riordan group, showing that our generalization is not fruitless.**

**Index Terms- Formal Laurent series; Bi-infinite matrices; Riordan group**

Due to copyright restriction we cannot distribute this content on the web. However, clicking on the next link, authors will be able to distribute to you the full version of the paper:

[Request full paper to the authors](#)

If your institution has an electronic subscription to Linear Algebra and its Applications, you can download the paper from the journal website:

[Access to the Journal website](#)

## **Citation:**

*Prieto-Martínez, L.F.; Rico, J. "Bi-infinite Riordan matrices: A matricial approach to multiplication and composition of formal Laurent series", Linear Algebra and its Applications, vol.731, pp.139-159, February, 2026.*