

FINITE AND INFINITE STRUCTURES OF RATIONAL MATRICES: A LOCAL APPROACH*

A. AMPARAN[†], S. MARCAIDA[†], AND I. ZABALLA[†]

Abstract. The structure of a rational matrix is given by its Smith-McMillan invariants. Some properties of the Smith-McMillan invariants of rational matrices with elements in different principal ideal domains are presented: In the ring of polynomials in one indeterminate (global structure), in the local ring at an irreducible polynomial (local structure), and in the ring of proper rational functions (infinite structure). Furthermore, the change of the finite (global and local) and infinite structures is studied when performing a Möbius transformation on a rational matrix. The results are applied to define an equivalence relation in the set of polynomial matrices, with no restriction on size, for which a complete system of invariants are the finite and infinite elementary divisors.

Key words. Rational matrices, Polynomial matrices, Smith-McMillan form, Finite and infinite structures, Localization, Möbius transformations.

AMS subject classifications. 15A54, 47A56, 15A21, 37P05.

*Received by the editors on February 26, 2014. Accepted for publication on May 2, 2015. Handling Editor: Joao Filipe Queiro.

[†]Departamento de Matemática Aplicada y EIO, UPV/EHU, Apdo. Correos 644, Bilbao 48080, Spain (agurtzane.amparan@ehu.es, silvia.marcaida@ehu.es, ion.zaballa@ehu.es). Supported by Dirección General de Investigación, Proyecto de Investigación MTM2013-40960-P, Gobierno Vasco GIC13/IT-710-13 and UPV/EHU UFI11/52.