THE MULTIVARIATE SADDLEPOINT APPROXIMATION TO THE DISTRIBUTION OF ESTIMATORS. A GENERAL APPROACH

JUAN CARLOS ABRIL[(*)], MARÍA DE LAS MERCEDES ABRIL and CARLOS I. MARTÍNEZ

Universidad Nacional de Tucumán. Consejo Nacional de Investigaciones Científicas y Técnicas (CONICET). Tucumán, Argentina
jabril@herrera.unt.edu.ar mabril@face.unt.edu.ar cimartinez@herrera.unt.edu.ar

ABSTRACT

We develop the theory of multivariate saddlepoint approximations. Our treatment differs from the one in Barndorff-Nielsen and Cox (1979, equation (4.7)) in two aspects:

- Our results are satisfied for random vectors that are not necessarily sums of independent and identically distributed random vectors, and
- We consider that the sample is taken from any distribution, not necessarily a member of the exponential family of densities.

We also show the relationship with the corresponding multivariate Edgeworth approximations whose general treatment was developed by Durbin in 1980, emphasizing that the basic assumptions that support the validity of both approaches are essentially similar.

Key words: Approximate distributions; Asymptotic expansions; Edgeworth approximations; Saddlepoint approximations.