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A SIMPLIFICATION OF THE LAPLACE METHOD FOR DOUBLE INTEGRALS. APPLICATION TO THE SECOND APPELL FUNCTION*

JOSÉ L. LÓPEZ† AND PEDRO J. PAGOLA†

Abstract. The main difficulties in the Laplace method of asymptotic expansions of double integrals result from a change of variables. Generalizing previous work for simple integrals, we propose a variant of the method for double integrals, which avoids this change of variables and simplifies the computations. The calculation of the coefficients of the asymptotic expansion is remarkably simple. Moreover, the asymptotic sequence is as simple as in the standard Laplace's method: inverse powers of the asymptotic variable. A new asymptotic expansion of the second Appell's function $F_2(a, b, b', c, c'; x, y)$ for large b, b', c and c' is given as an illustration.

Key words. asymptotic expansions of integrals, Laplace method for double integrals, second Appell function

AMS subject classifications. 41A60, 41A58, 33C65

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†Departamento de Ingeniería Matemática e Informática, Universidad Pública de Navarra, 31006-Pamplona, Spain ({jl.lopez,pedro.pagola}@unavarra.es).