

Laplace Approximation for Bessel Functions of Matrix Argument

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Abstract

We derive Laplace approximations to three functions of matrix argument which arise in statistics and elsewhere: matrix Bessel A_ν ; matrix Bessel B_ν ; and the type II confluent hypergeometric function of matrix argument, Ψ . We examine the theoretical and numerical properties of the approximations. On the theoretical side, it is shown that the Laplace approximations to A_ν , B_ν and Ψ given here, together with the Laplace approximations to the matrix argument functions ${}_1F_1$ and ${}_2F_1$ presented in Butler and Wood (2002), satisfy all the important confluence relations and symmetry relations enjoyed by the original functions.