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SOME SPECIAL FUNCTIONS AND SETS OF POLYNOMIALS OF SEVERAL COMPLEX VARIABLES

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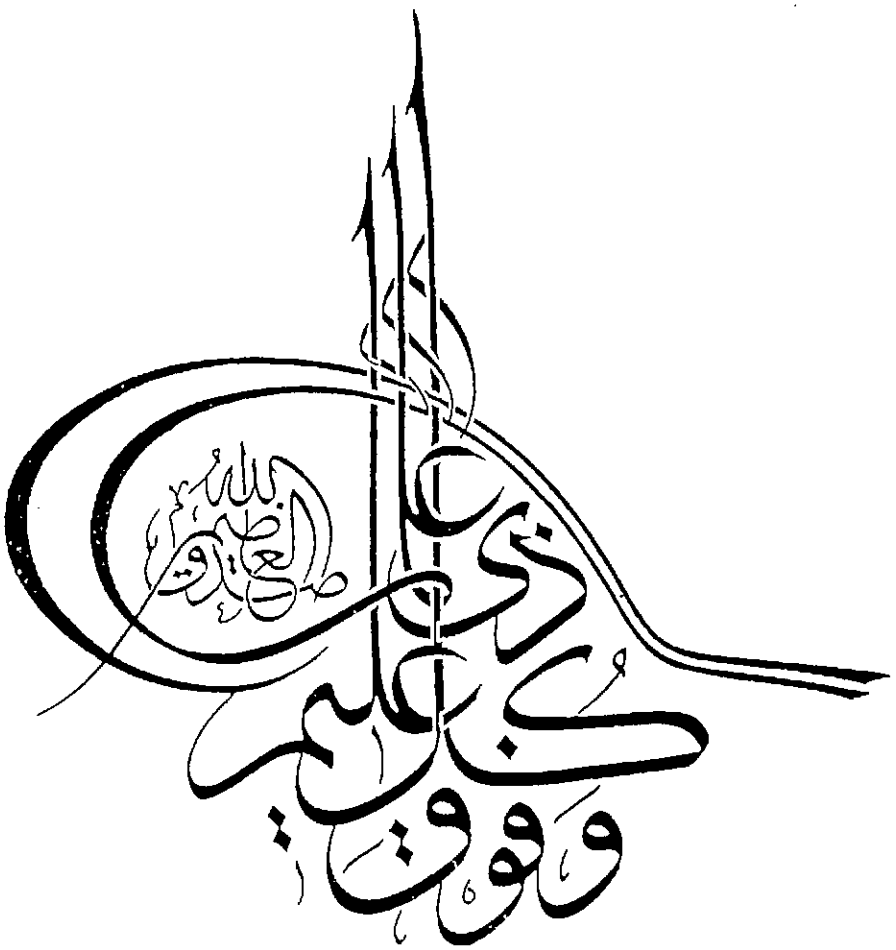

(سورة يوسف ، آية ٧٦ ك)

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ARABIC SUMMARY

SOME SPECIAL FUNCTIONS AND SETS OF POLYNOMIALS OF SEVERAL COMPLEX VARIABLES

This thesis is considerd one of various theses which presented and still presented by the school established by Nassif (1915-1986) and managed by Sayyed in one of the branches of complex analysis. It contains a study in the field of special functions, similar sets of polynomials, finite product sets and Hadamard product sets.

This thesis is devided into four chapters.

In the first chapter defines the composite Appell's hypergeometric functions when its constituent are hypergeometric functions of two complex variables. Some results were obtained under the act of some differential operators such as D, D^N.

This study is a complentery to that conducted recently by Sayyed and Makky [18] in the case of one variable.

So we acted it on one of Jackson functions and a new kind of (m,n)-hypergeomtric functions.

We also used the g(D)-operators which was introduced by Sayyed [35] on Appell's functions, one of Jackson functions, composite hypergeomtric functions, composite Appell's hypergeometric functions, generalized hypergeountric functions and -generalized hypergeomtric functions.

In each case partial differential equations of two complex variables with known solutions were obtained. The integral operators defined by Sayyed and Kishka [11] and Sayyed, Abul-Ez [2] have been introduced into one of Appell's functions.

At the end of this chapter, a definition of Bessel functions and modfied Bessel functions has been suggested. A set of recurrence relations were obtained when differential operators were used.

The second chapter defines and studies similar sets of polynomials of two complex variables as an extension of those defined by Sayyed and Mena [44,45] in one variable.

For the sake of getting effectiveness of these sets of polynomials in closed hyperesphers, the constituent are simple ones under certian conditions. The effectiveness of the product sets and inverse sets in closed hyperesphers with bound radii was obtained.

We got the effectiveness of these sets at the origin when its constituent are algebraic sets and submit to certain conditions and when the constituent are general sets and submit to conditions on their maximum mouduls. We also obtained the effectiveness of sets in open hyperespher when the constituent are algebraic sets and submit to certain conditions and the conclusion of effectiveness for all entire functions.

Inverse similar sets and power similar sets of polynomials of two complex variables were defined. The necessary and sufficient condition for the effectiveness of these sets in closed spheres when their constituent are simple and effective in these spheres was obtained.

The third chapter is devided into two parts. The first part is concerned with the study of order of magintud of coefficients of similar sets of polynomials of two complex variables and their relations with the effectiveness of these sets. A numerical example has been given to prove that the result obtained is best possible. Besides an upper bound of the order of these sets in this case was obtained. A numerical example was given, also, to prove that it is valied.

The second part is an extension of the study conducted by Sayyed and Metwally [20] of the transposed inverse similar sets of polynomials of one complex variable. The effectiveness of these sets was found in closed circles when their constituent submit to Halim's conditions, when submit to some conditions which we have interduced in this study, when their constituent are algebraic and submit to certian conditions on the maximum modulus.

This part ends with the addition of a new kind of similar sets, namly the composite similar sets of polynomials of two complex variables. The effectiveness of these sets was obtained in closed spheres when the constituent are simple and effective in closed circles under certain conditions.