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Applications of multiple hypergeometric function of srivastava daoust and generalized polynomials of srivastava in a problem of heat conduction

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ABSTRACT

The present paper is motivated by the frequent requirement of various properties of special function which play a vital role in the study of potential theory, heat conduction and other allied problems in Quantum mechanics. First we evaluate an integral involving the product of multiple hypergeometric function of Srivastava and Daoust [21,22,23] Hermite polynomials and several generalized polynomials of Srivastava [20], and make its applications to solve a problem in heat conduction. One expansion formula is also established and finally special case are also discussed to derive the results involving various polynomials.

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Keywords : Multiple hypergeometric function of Srivastava and Daoust, Heat Conduction Generalized polynomials of Srivastava Laguerre, Hermite and Jacobi polynomials.

1. Introduction. Appell's functions and the functions related to them have many applications in Mathematical Physics ([14],[15],[16]). Srivastava, Gupta and Goyal [29] have discussed a problem on heat conduction in a finite bar using H -function of two variables of Srivastava and Panda ([26],[27],[28]). Chandel and Gupta [5] have discussed this problem involving generalized multiple hypergeometric function of Srivastava and Daoust ([21],[22],[23]; also see Srivastava and Karlsson [25,p.37, eqns (2.1) to (2.3)]). Singh [18] used generalized hypergeometric function in a problem of cooling of a heated cylinder. Further Singh [19] evaluated some integrals involving Kampé de Fériet function and one of them was used to obtain a solution of a problem on heat conduction given by Bhonsle [1]. Chandel and Yadava [3] have evaluated certain integrals involving multiple hypergeometric function of Srivastava and Daoust ([21], [22], [23]; also see Srivastava and Karlsson [25, p.37, eqn. (2.1) to (2.3)]; Srivastava and Manocha [24 p.64 eqns (18) to (20)].) and their applications have been made in solving the same problem on heat conduction. Chandel and Tawari [7] also employed multiple hypergeometric function of Srivastava and Daoust ([21], [22], [23]) in two boundary value problems. Chaurasia and Patni [10] have discussed a problem on heat conduction involving the product of multivariable H -function of Srivastava and Panda ([26], [27], [28]; see also Srivastava, Gupta and Goyal [29]) and two generalized polynomials of Srivastava [20], while Chaurasia and Gupta [11] have discussed a solution of partial differential equation of heat conduction in a rod under Robin condition.

Recently, Chandel and Sengar [8] have discussed two boundary value problems