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Integrals Involving Airy Functions IOPscience

Integrals involving Airy functions J R Albright and E P Gavathas
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Mathematical and General , Volume 19 , Number 13

Integrals involving Airy functions - IOPscience

Abstract. We show how to evaluate a large number of integrals involving Airy functions. The method uses the fact that the Wronskian has a very simple form. A recent paper by Wille and Vennik (1985) presented a derivation of the result $A_i(x)B_i(x) (A_i^2(x) + B_i^2(x))' dx = 48$ where $A_i(x)$ and $B_i(x)$ are the standard Airy functions.

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A large number of indefinite integrals of the form $\int x^n y^1 y^2 dx$ have been evaluated in terms of x , y^1 , y^2 and their first derivatives; y^1 and y^2 are both solutions of the differential equation $y''=xy$. Some of these integrals can be applied to the quantum mechanical problem of a particle in a uniform field of force.

Integrals of products of Airy functions - IOPscience

A new integral representation of the Hankel transform type is deduced for the function $F_n(x, Z) = Z^{n-1} A_i(x-Z) A_i(x+Z)$ with $x \in \mathbb{R}$, $Z > 0$ and $n \in \mathbb{N}$. This formula involves the product of Airy functions, their derivatives and Bessel functions.

Integrals involving products of Airy functions, their ...

Integrals of products of Airy functions 487 The rows corresponding to $Dy'y$, Dxy'' and Dx^2yZ form another such set, with the equation $D[\$]=[\$]$ Inversion of the 3×3 matrix yields from which it is an easy matter to read off three expressions for integrals of products of Airy functions.

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The integral $\int Ai(x)Bi(x) = \int_0^\infty (Ai'(x)+ Bi^2(x))' dx$ which occurred in Harrell's study (1981) of the asymptotics of the gaps in Mathieu's equation, was recently evaluated this using special formulae for the Airy functions (Wille and Vennik 1985). This comment presents a simpler procedure for evaluating

Journal of Physics A: Mathematical ... - iopscience.iop.org

Airy functions are also central to the 'quantum bouncer' problem, a point mass subject to the potential This problem is amenable to a variety of approximate treatments (WKB approximation, variational methods, numerical approaches including the shooting method), all of which can be compared to the exact solutions, given in terms of the Airy ...

Constraints on Airy function zeros from quantum-mechanical ...

The exponential term $\exp(\sigma\xi)$ produces quite a smoothing of the oscillations of the Airy function over the negative ξ range, thus allowing the squared amplitude integral of the $\psi Ai^*G s$ to

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converge to a finite value (see figures 2.2 (b)– (d)).

A note on the Airy beams in the light of the symmetry ...

We collect here some of the useful identities involving integrals over Airy functions needed in this paper. Versions of these results have been derived in [38, 39]. In each case, the identities are most easily proved by direct differentiation of the right-hand sides.

The Stark effect in linear potentials - IOPscience

In terms of Airy functions. Ascending series. Asymptotic series. Primitive of Scorer functions. Repeated primitives. Product of Airy Functions . The method of Albright. Some primitives. Other Primitives. Miscellaneous. Elementary Integrals . Particular integrals. Integrals containing a single Airy function . Integrals involving algebraic ...

Primitives and Integrals of Airy Functions | Airy ...

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Abstract In this paper, using the integral identities of Bessel functions, we obtain new integral identities for the products of Airy functions. We get various integrals involving the Widder potential, the Fourier sine and cosine transforms of the products of Airy functions in terms of some special functions. Communicated by H. M. Srivastava

Some integral identities for products of Airy functions ...

In this paper, we are concerned with the numerical approximation of the integrals with a highly oscillatory Airy kernel of the form (1.1) $I[f] = \int_0^1 x^\alpha (1-x)^\beta f(x) Ai(-\omega x) dx$, $\alpha > -1$, $\beta > -1$, $\omega \gg 1$, where $f(x)$ is a sufficiently smooth function on $[0, 1]$, $Ai(x)$ is an Airy function. The integrals play an important role in many ...

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Numerical evaluation of a class of highly oscillatory ...

Certain integrals involving Airy functions are surprisingly easy because of the simplicity of the differential equation, and there is an excellent list of these on pages 43–45 that was great fun to go through." ...

Airy Functions and Applications to Physics

So the integrals should be expressed by Bessel and Struve functions. Indeed, there occurred some exceptions. Generally, integrals of the type $\int x^\mu \nu(x) dx$ may be written with Lommel functions, see [8], 10–74, or [3], III. In many cases recurrence relations define more integrals in a simple way. Partially the integrals may be found by MAPLE ...

TABLES OF SOME INDEFINITE INTEGRALS OF BESSEL FUNCTIONS OF ...

Starting with an extensive introductory chapter on basic formulas, the treatment advances to indefinite integrals, examining them in terms of Lommel and Bessel functions. Subsequent chapters explore airy functions, incomplete gamma function and related functions, repeated integrals of Bessel functions, and integrals involving Struve functions.

Integrals of Bessel functions (eBook, 2014) [WorldCat.org]

Evaluate a definite integral involving Airy functions. 2. How can I devise a general approach to solving an indefinite integration problem? 1. Showing Airy's Integral (Fourier Transform of $e^{-ip^3/3}$) Converges. 1.

integration - Integral involving derivatives of Airy ...

ABSTRACTA new method is presented for deriving indefinite integrals involving quotients of special functions. The method combines an integration formula given previously with the recursion relations obeyed by the function. Some additional results are presented using an elementary method, here called reciprocation, which can also be used in combination with the new method to obtain additional ...

Indefinite integrals of quotients of special functions ...

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Starting with an extensive introductory chapter on basic formulas, the treatment advances to indefinite integrals, examining them in terms of Lommel and Bessel functions. Subsequent chapters explore airy functions, incomplete gamma function and related functions, repeated integrals of Bessel functions, and integrals involving Struve functions.

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