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The Gauss-Airy functions and their properties. (English summary)
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In this paper the author defines a Gauss-Airy function by introducing a Gaussian distribution in the integral representation of the Airy function. The properties of this integral transform are derived by means of several techniques:

1. It is shown, using operational calculus, that the Gauss-Airy function generates the three-variable Hermite polynomials.
2. The first roots of the function are obtained through a Weierstrass infinite product.
3. Some inequalities are established by a method devised in [M. Salmassi, J. Math. Anal. Appl. **240** (1999), no. 2, 574–582; MR1731663] for the usual Airy functions.
4. An explicit formula for the Gauss-Airy function is given in terms of an exponential factor and a translated Airy function.
5. Using the previous formula, orthogonality relations and some integral transforms are found.

This concise and direct paper can be used to derive some properties of the Gauss-Airy integral transform, but the reader may want to compare it with other sources for equivalent or even more general definitions of Airy-Gauss beams [see, e.g., M. A. Bandres and J. C. Gutiérrez-Vega, Optics Express **15** (2007), no. 25, 16719–16728, doi:10.1364/OE.15.016719]. For some physical applications of such functions originating in quantum mechanics one may read [M. V. Berry and N. L. Balazs, Amer. J. Phys. **47** (1979), no. 3, 264–267, doi:10.1119/1.11855], and [G. A. Siviloglou and D. N. Christodoulides, Optics Lett. **32** (2007), no. 8, 979–981, doi:10.1364/OL.32.000979] in connection with paraxial optics.

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