

## New Bosonic Operator Ordering Identities Gained by the Entangled State Representation and Two-Variable Hermite Polynomials

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**Abstract:** Based on the technique of integration within an ordered product of operators, we derive new bosonic operators' ordering identities by using entangled state representation and the properties of two-variable Hermite polynomials  $H_{m,n}$ , and vice versa. In doing so, some concise normally (antinormally) ordering operator identities, such as  $a^{\dagger m} a^n = \frac{1}{m! n!} H_{m,n}(a^{\dagger}, a) \dagger$ ,  $a^n a^{\dagger m} = (-i)^{m+n} H_{m,n}(ia^{\dagger}, ia)$  are obtained.

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Key words: operator ordering, entangled state, two-variable Hermite polynomials

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