New Normally Ordered Four-Mode Squeezing Operator for Standard Squeezing of Four-Mode Quadratures

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Abstract: By virtue of the technique of integration within an ordered product of operators a new four-mode squeezing operator that squeezes the four-mode quadrature operators of light field in the standard way is found. This operator differs from the direct product of two two-mode squeezing operators. It is the exponential operator $V \equiv \exp[ir(Q_1P_2+Q_2P_3+Q_3P_4+Q_4P_1)]$. The Wigner function of the new four-mode squeezed state is calculated, which quite differs from that of the direct-product state of two usual two-mode squeezed states.

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