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Title: Pseudo-Hermitian $\mathcal{PT}$-symmetric Hamiltonians: Uncertainty relations

Abstract: In the usual quantum theory, Robertson's formalized version of the Heisenberg uncertainty relation contains a state of interest and two incompatible observables that are Hermitian operators. An important question to ask is how do the uncertainty relations look like for the pseudo-Hermitian $\mathcal{PT}$-symmetric systems? Are the observables still Hermitian? Is there a unique formulation of the uncertainty relation that is valid in both the $\mathcal{PT}$-symmetric as well as $\mathcal{PT}$-broken phase? How do the minimum uncertainty states behave, are those eigenstates of certain observables depending on the given incompatible observables? We answer all of these questions [**?**, 1]ithin the framework of the recently proposed G-metric inner product for the pseudo-Hermitian $\mathcal{PT}$-symmetric systems [**?**, 2] Uncertainty relations have been debated in the last two decades for conceptual reasons as well as their triviality for certain states, e.g., eigenstates of one of the incompatible observables. This debate led to stronger sum uncertainty relations and error-disturbance relations. Some of our new results validate the sum uncertainty relations specially in the context of minimum uncertainty states for the pseudo-Hermitian $\mathcal{PT}$-symmetric systems.

References:

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