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Inverting the Nakanishi weight function for a bound-state

Wednesday, 23 September 2015 10:00 (30 minutes)

We report our attempts in extracting the Nakanishi weight function for a S-wave bound-state using a model for the Bethe-Salpeter amplitude from a given form of the weight function. Both the Bethe-Salpeter amplitude in Euclidean space and the valence light-front wave function are written in terms of the Nakanishi integral representation, and through that we formulate an inhomogeneous integral equation problem to solve for the weight function. This linear problem is ill-defined and for the matrix inversion, we study the stability of the resulting weight function by truncation on the small eigenvalues. Reasonable numerical accuracy is found when the weight function is obtained starting from the valence light-front wave function, while using the Euclidean Bethe-Salpeter amplitude the numerical solution compared with the exact Nakanishi weight function model shows much less accuracy. Our work suggests the possibility to build the Bethe-Salpeter amplitude from the light-front valence wave function, which will be useful for building covariant models, e.g., for hadrons.
Work done in collaboration with J. Carbonell and V. Karmanov.

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