

Title: Analysis of the Stieltjes imaging method for the calculation of resonance widths

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Abstract: This thesis deals with the moment problem in the context of the resonance widths. The moment problem was solved by the Stieltjes imaging method and proposed alternative method based on the direct decomposition into the orthogonal basis. Three different basis derived from the Legendre polynomials were chosen. The properties of these methods were studied by analytical function. Eventually, both methods were applied to the calculation of resonance width of the metastable ion $\text{CH}_3\text{F}(2s^{-2})^{2+}$.

Keywords: moment problem, Gaussian quadrature, orthogonal polynomials, resonance widths, decay of metastable ions