Analytic representation with theta function describing finite quantum systems

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Quantum systems in Hilbert spaces of finite dimension d is studied using the analytic representation approach. The states of such systems are represented with theta functions on a torus. These functions have exactly d zeros, which can be used to describe the time evolution of the finite quantum systems in terms of d paths on the torus. We develop a reproducing kernel formalism for such systems, which is the analogue of the resolution of identity, in the language of the analytic representation. We also study in detail the d paths of the zeros of periodic systems using a proposed semi-analytic method for calculating the paths of the zeros.