

COMPARISON BETWEEN THE METHODS OF DETERMINATION OF EIGENVALUES OF ENERGY IN BILLIARDS

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The present work aims at evaluating the different methods of determining the eigenvalues of energy in some billiards by checking the correct identification of these levels. It also intends to understand the limitation of the methods which causes the so-called evanescent states such as the methods that employ the superposition of plane waves. In a preliminary study, we used the triangular billiards which produces the exact results for some geometry and also provides an established basis which is cancelled in its boundaries for any geometry of the triangular billiards. Therefore, it is possible to develop a traditional method of superposition of plane waves and calculate, by means of numerical methods, their energy levels. We also worked on the Hellers method of superposition of plane waves, which uses a simpler and general basis and is concerned only with minimizing a parameter called tension in the boundaries of the billiards. However, by employing this method in billiards, some of the states may be absent (evanescent state). Recently, it was proposed the boundary wall method, which deals with the problem of scattering through thin walls by using the Lippmann-Schwinger equation in which, concerning the billiards stadium, presents the states that are absent in the solution of the problem by the Hellers method. The preliminary results show that the boundary wall method presents the same results as the traditional method of plane wave superposition. In this way, we hope to understand the mechanisms of exclusion of states in the Hellers method for this group of billiards.