Title:	Quantum Brayton Engine of Non-Interacting Fermions in a One Dimensional Box
Authors:	Singh, Satnam (/jspui/browse?type=author&value=Singh%2C+Satnam)
Keywords:	Brayton Cycle Particle in box Quantum Heat engine Quantum thermodynamics
Issue Date:	2020
Publisher:	Springer
Citation:	International Journal of Theoretical Physics, 59(9), pp.2889-2900.
Abstract:	We consider the toy model of quantum Brayton cycle, constructed from non-interacting fermions, trapped in a one-dimensional box. We use all energy levels of the box. The work and the energy input in this cycle are calculated from the expectation values of the Hamiltonian. We analytically calculated the efficiency of the cycle, efficiency at maximum work and Clausius relation as the function of the ratio of the lengths. We found that the efficiency of the cycle does not depend on the number of fermions. It depends on the ratios of the lengths of the cycle, while the power depends on the number of fermions. The irreversibility of the cycle also does not depend on the number of particles. It only depends on the ratio of the box lengths. Moreover, We also analysed the relation of efficiency and the power of the cycle. We found that as we decrease the ratio of the lengths, the efficiency at maximum power and the maximum power of the cycle increases. The power of the cycle increases as we increase the number of the particles.
URI:	https://link.springer.com/article/10.1007/s10773-020-04549-3 (https://link.springer.com/article/10.1007/s10773-020-04549-3) http://hdl.handle.net/123456789/3392 (http://hdl.handle.net/123456789/3392)
Appears in Collections:	Research Articles (/jspui/handle/123456789/9)

Files in This Item:

File	Description	Size	Format	
need to add pdf....odt (/jspui/bitstream/123456789/3392/1/need%20to%20add%20pdf....odt)		8.12 kB	OpenDocument Text	View/Open (/jspui/bitstream/1234

Show full item record (/jspui/handle/123456789/3392?mode=full)
(/jspui/handle/123456789/3392/statistics)