

Abstract Submitted  
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**Effects of the boundary geometry on the edge current in the two dimensional topological insulator**<sup>1</sup> HYEONJIN DOH, HYOUNG JOON CHOI, Center for Computational Studies of Advanced Electronic Material Properties, Yonsei University — We study the effects of the boundary shape on the edge transport of the two dimensional topological insulator described by Kane-Mele model. The edge state is robust against all time-reversal invariant defects. However, when we consider an arbitrary sample, the edge is not straight and consists of various types of boundaries. Actually, the transport property of the edge-state in the Kane-Mele model depends on the boundary type of the edge such as zigzag and armchair edges. Therefore, the edge-transport can be affected by a corner connecting two different types of edges. Here, we investigate the energy spectrum of the various shapes of finite-size honeycomb lattice with corners along the edge. We also calculate the transport properties on the edges by applying an artificial gauge field which drives a persistent current along the edges. Although the corner of the edge seems a geometrical defects and is expected to have a little effect on the transport, our results show that the geometrical defects strongly affect the edge current depending on the corner types.

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