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Study of magnetic properties of graphene nanostructures and graphene nanoribbons

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Abstract
The discovery of graphene and its remarkable electronic and magnetic properties has initiated great research interest in this material. Furthermore, there are many derivatives in these graphene related materials among which graphene nanoribbons and graphene nanofragments are candidates for future carbon-based nanoelectronics and spintronics. Theoretical studies have shown that magnetism can arise in various situations such as point defects, disorder and reduced dimensionality. Using a mean field Hubbard model, we studied the appearance of magnetic textures in zero-dimensional graphene nanofragments and one-dimensional graphene zigzag nanoribbons. Among nanofragments, triangular shape, bowtie and coronene were studied. We explain how the shape of these materials, the imbalance in the number of atoms belonging to the graphene sublattices, the existence of zero-energy states and the total and local magnetic moments were related. At the end, we focused on the effects of a model disorder potential (Anderson-type), and illustrate how density of states of zigzag nanoribbons was affected.

Keywords: graphene, mean field Hubbard model, graphene nanoribbons

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