Graphene with two dimensional magnetic modulation

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Abstract
We consider monolayer graphene under a periodically modulated magnetic field. Using the magnetic translational symmetry and the tight binding approximation, We show that a modified Harper Equation can describe such purely magnetic problem without any scalar potential. We compare the resulting Harper equation with the prototype Harper- Hofstadter problem that describes non-relativistic and relativistic electrons in a uniform magnetic field and periodic scalar potential. We analyse the resulting energy spectrum (band structure) as well as the transport properties of the charge carriers of graphene in such periodic magnetic modulation.
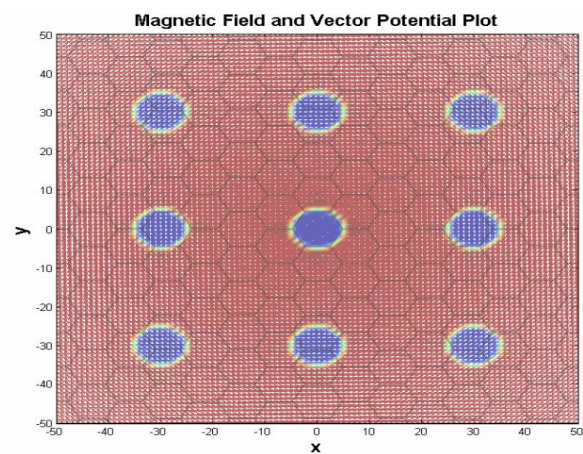
Figures

Figure 1: Applied perpendicular periodic magnetic field (different colours depicting different values of the field) and corresponding vector potential on graphene sheet

References

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