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【113】Electronic Viscous Flow in Hexagonal Boron Nitride Encapsulated Graphene FETs

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Conventional electron transport in conductors involves diffusive scattering and interactions with lattice vibrations, resulting in Ohmic behavior. However, a distinct regime arises when electron-electron interactions induce correlated, momentum-conserving flow akin to classical fluid dynamics. Our study delves into charge hydrodynamic transport, revealing width-dependent conductivity and reduced resistivity at higher electron temperatures. We observe charge vortices and validate viscous effects over a broad temperature range, including room temperature, particularly notable in graphene compared to other systems. Finite element calculations confirm our findings and suggest geometries to enhance viscous effects, promising applications like geometric rectifiers and charge amplifiers. This research advances our understanding and utilization of charge hydrodynamics in graphene-based systems.

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