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Non-linear plasma transport in graphene channels and application to the detection of terahertz signals SERGEY RUDIN, GREG RUPPER, U.S. Army Research Laboratory, Adelphi, Maryland 20783 — The non-linear electron plasma response to electromagnetic signal applied to a gated graphene conduction channel can be used to make a graphene based Dyakonov-Shur terahertz detector. The hydrodynamic model predicts a resonance response to electromagnetic radiation at the plasma oscillation frequency. With less damping and higher mobility, the graphene conduction channels may provide higher quality plasma response than possible with semiconductor channels. Our analysis of plasma oscillations in a graphene channel is based on the hydrodynamic equations which we derive from the Boltzmann equation accounting for both electrons and holes, and including the effects of viscosity and finite mobility.

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