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Compressibility of bilayer graphene: the role of disorder

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We discuss the role of disorder caused by charged impurities on the compressibility of bilayer graphene. In doing so, we take into account the full hyperbolic dispersion relation and the presence of a gap between the valence and conduction bands to produce an exact calculation of $\frac{d\mu}{dn}$ for the non-disordered case. We then introduce two methods for including the disorder in a statistical way and evaluate the effectiveness of each by comparing their predictions with recent experiments. We find that averaging is best done at the level of the observable quantity: in this case the compressibility. This work is done in collaboration with Sankar Das Sarma and Euyheon Hwang, and supported by US-ONR, NRI-SWAN, and UMD-CNAM.