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SCATTERING OF PLASMONS IN CLOSELY PACKED 1D GRAPHENE STRUCTURES

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We present a comprehensive study of graphene plasmon eigenmodes in 1D periodic structures formed by plasmonic junctions of different types. Transmission and reflection coefficients composing scattering matrix of a junction are obtained directly from numerical solutions of equations describing the plasmons in the considered structures. The obtained results for the single junctions are in perfect agreement with analytical formulas for the cases when they are available. Using our method as a reference, we analyze the limitations of the semi-phenomenological transfer matrix approach applied to the calculation of reflection from the double-junction structures. Our results can be useful in designing and calculating graphene plasmon resonators, waveguides, switches, etc.

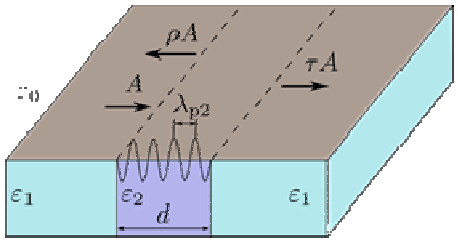

Figure 1. Schematic view of the graphene plasmon double-junction supported by a wafer with discontinuously changed dielectric permittivity.

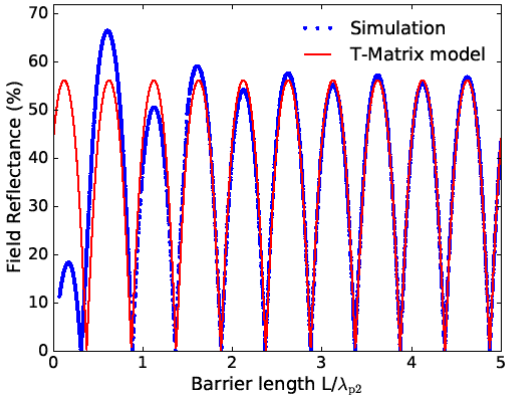

Figure 2. Absolute value of the reflection coefficient of a plasmon in graphene scattered on a barrier formed by the two junctions versus its normalized length. Solid line shows the reflectance predicted by a transfer matrix model, and circles are calculated with our numerical analysis.