303. Title: Terahertz surface plasmons in optically pumped graphene structures
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Abstract:We analyze the surface plasmons (SPs) propagating along optically pumped single-graphene layer (SGL) and multiple-graphene layer (MGL) structures. It is shown that at sufficiently strong optical pumping when the real part of the dynamic conductivity of SGL and MGL structures becomes negative in the terahertz (THz) range of frequencies due to the interband population inversion, the damping of the THz SPs can give way to their amplification. This effect can be used in graphene-based THz lasers and other devices. Due to the relatively small SP group velocity, the absolute value of their absorption coefficient (SP gain) can be large, substantially exceeding that of optically pumped structures with dielectric waveguides. A comparison of SGL and MGL structures shows that to maximize the SP gain the number of graphene layers should be properly chosen.