Flake Thermal Conductivity of Graphene

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The Kubo formula for the thermal conductivity of per stratum of few-layer graphene, up to five, are analytically calculated within the tight-binding Hamiltonian model and Green's function technique, compared with the single layer one. The results show that by increasing the layers of the graphene, this conductivity decreases. Although, the change in its magnitude varies less as the layer number increases to beyond two. This could be explained by overlapping of the normal oriented non-hybridized pz orbital. So that in analogy with isolated single layer, these inter-layer interactions provide new vertical channels for moving electrons and distract a fraction of their motivation from horizontal traces parallel to the layers, towards new built-in perpendicular tracks. In other words, overlapped non-hybridized pz orbital gives rise to a partial deviation of the electrons' mobility from the planes for the sake of upright directions. The consequence of these inter-layer possibilities of movement would be a reduction in the intra-layer displacements, and hence, a decay in the flake thermal conductivity. This phenomenon is of more significance as the number of the layers increases, rationally compatible with the last argument, because adding more layers generates more detour paths for electrons, so the plane components of motion will bear a decline.