Derivation of extended boundary conditions for Navier-Stokes equations

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In aerodynamic problems, the description of the flow around a vehicle is a very important task and the physical models proposed in the simulations strongly depend on the altitude.
In particular, at high altitude, the flow is in the rarefied regime and mesoscopic descriptions have to be used. On the contrary, at low altitude, the air is a continuous medium and the flow can be described by the compressible Navier-Stokes equations. In the intermediate layers both approaches give the same solution: the Chapman-Enskog theory shows that the Navier-Stokes system is an asymptotic approximation of the Boltzmann equation for small mean free path.
We are interested in computing an accurate solution in the middle-low altitude regimes. Therefore a detailed analysis of the interaction gas-wall, and hence the construction of the correct boundary conditions, are necessary.
A boundary layer analysis suggests that, for the Navier-Stokes equations, a slip velocity and a temperature jump have to be imposed at the solid boundary; such conditions are already used but with empirical coefficients (modified Maxwell boundary conditions).
We want to deduce them in a rigorous way by revisiting the approach proposed by F. Coron (1988) which mixes the Chapman-Enskog expansion and the boundary layer analysis.