Application of Lattice Boltzmann Method in automotive industry

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The lattice Boltzmann Method, associated to a turbulence model, can be used for high Reynolds number flow simulations on complex geometry. In automotive industry, the LBM-based commercial code PowerFLOW is widely used in many application fields : aerodynamic optimization, computation of aeroacoustic sources, thermal management simulations. In this talk, the main features of PowerFLOW are presented (LBM model, turbulence model, immersed boundary condition approach,...). Some examples of aerodynamic drag simulations are given. The LBM allows the simulation of weakly compressible flows. Therefore, it is well suited for aeroacoustic computations. The example of the direct computation of the noise generated by an automotive ventilation outlet is presented. In aeroacoustic field, other applications such as sunroof buffeting simulation or the prediction of wall pressure fluctuations on side windows will be also discussed.