Simulation of airflow around a vehicle in the wind tunnel

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The aim of simulation, input data and conditions

Air velocity from 0 to 5 m/s (directed along the longitudinal axis of the car from the rear side)

Ambient temperature 20°C

The pressure of atmospheric air is 760 mmHg

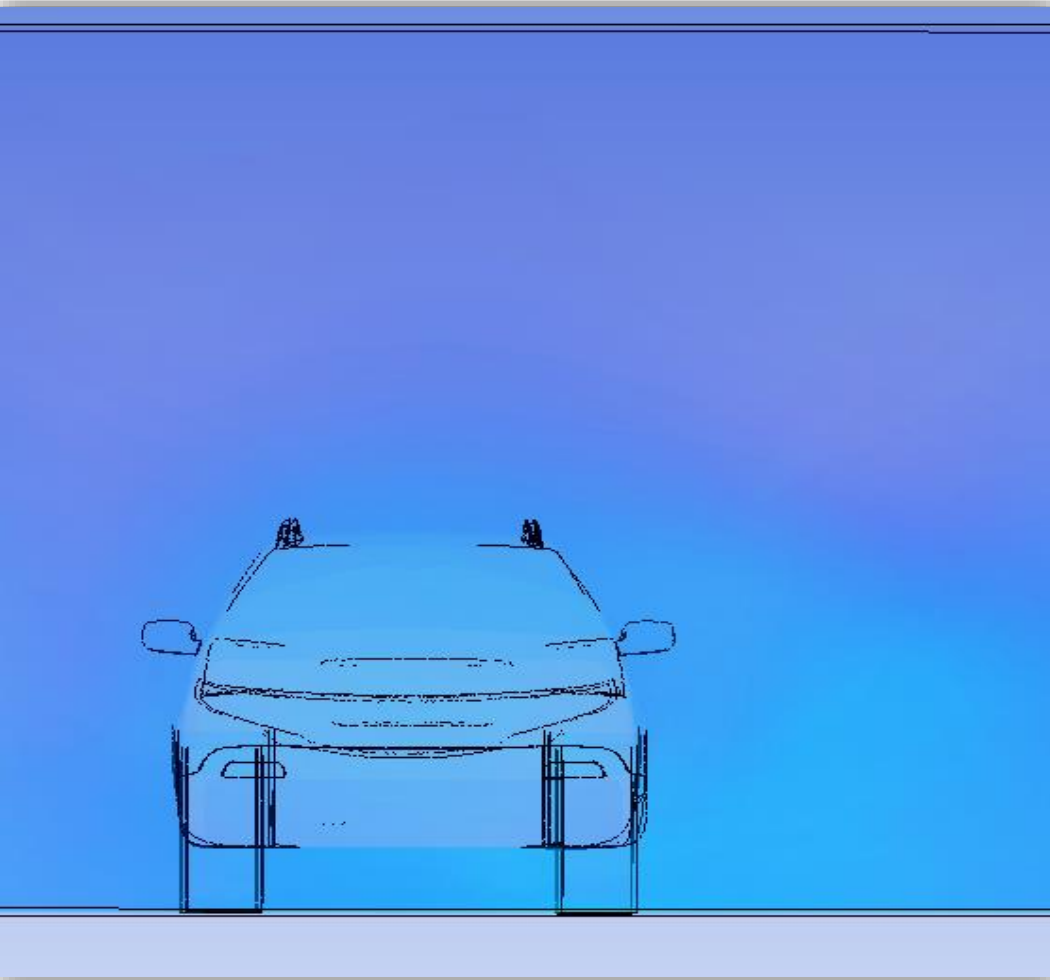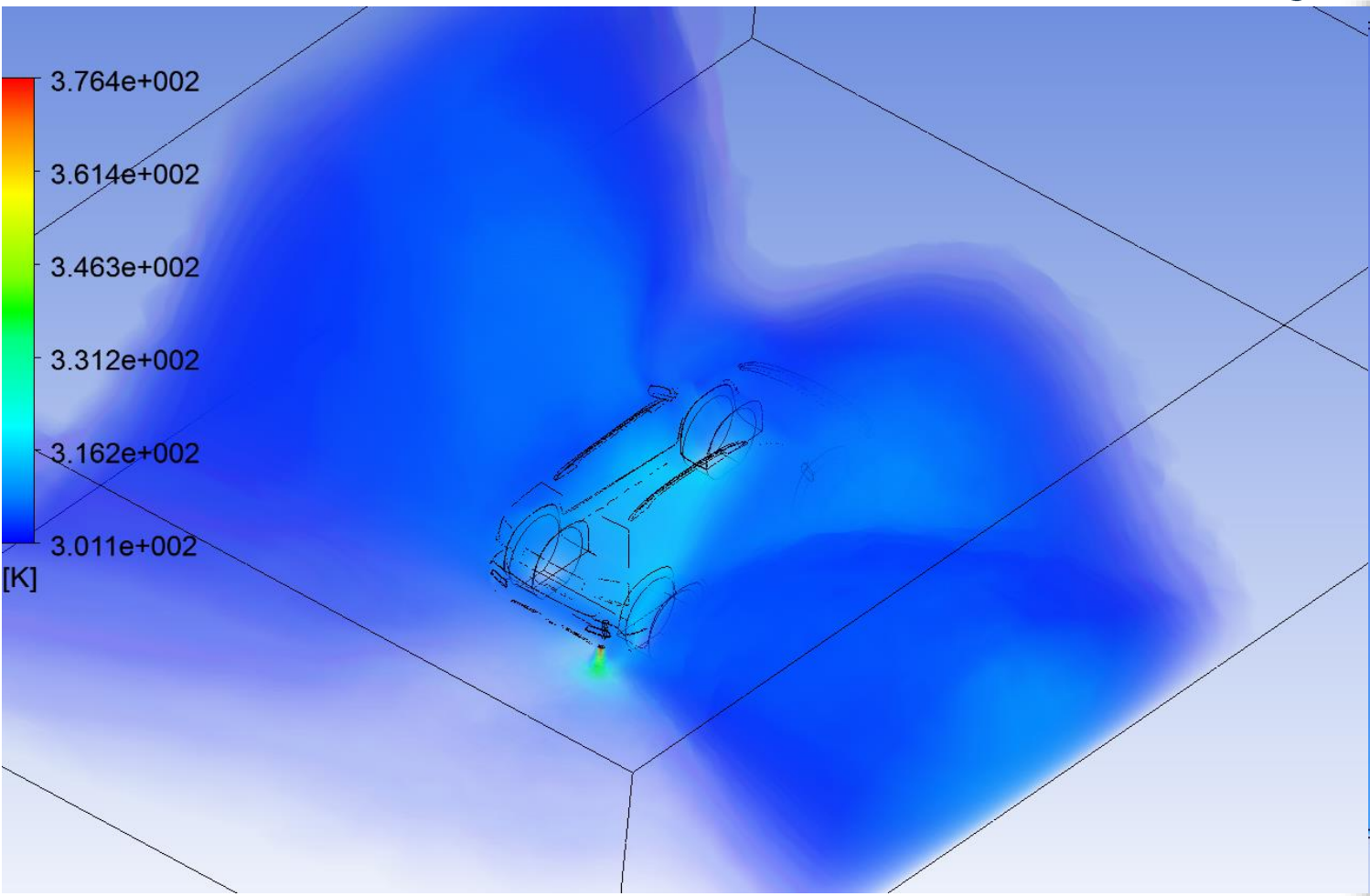Exhaust gas flow rate 17 kg/h

CO_2 concentration in exhaust gases 13.5%

Exhaust gas temperature 60°C

The diameter of the exhaust pipe - 40 mm (one pipe, located on the passenger side and directed downwards)
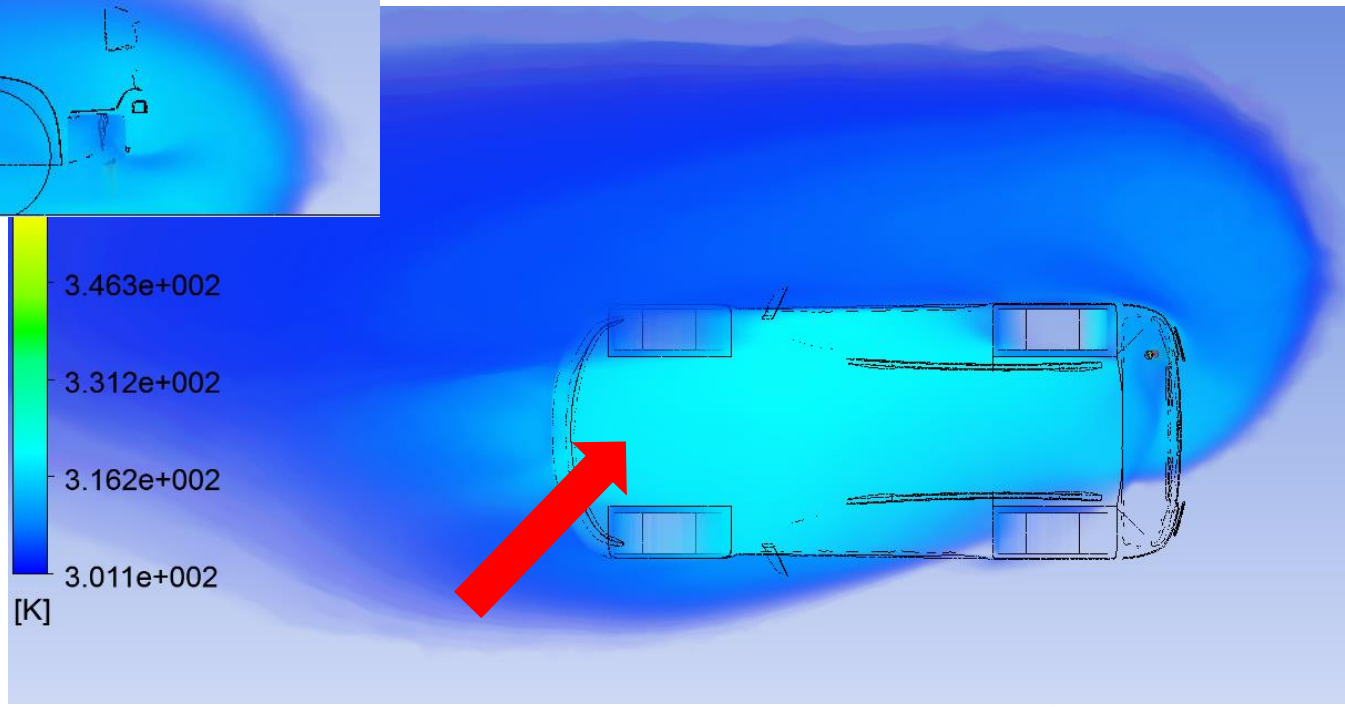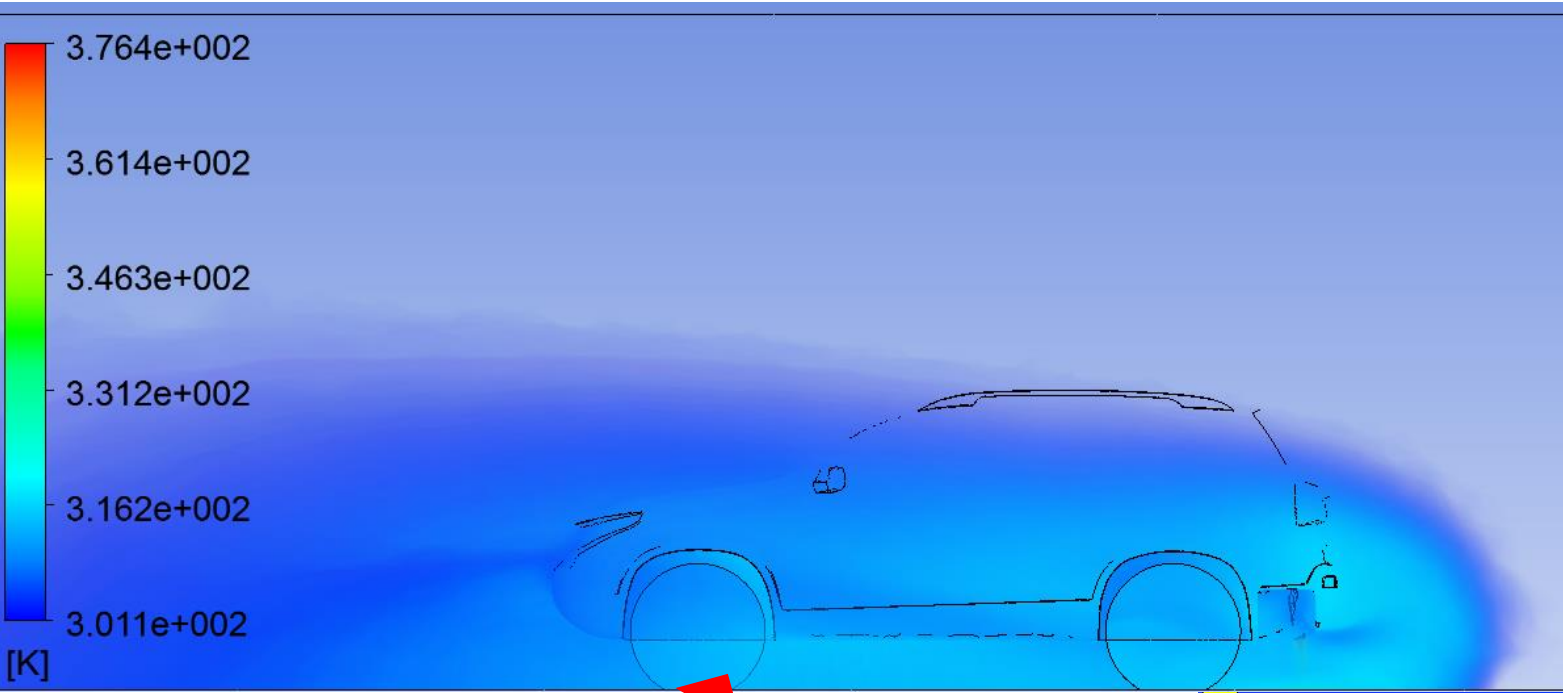
Simulation software ANSYS

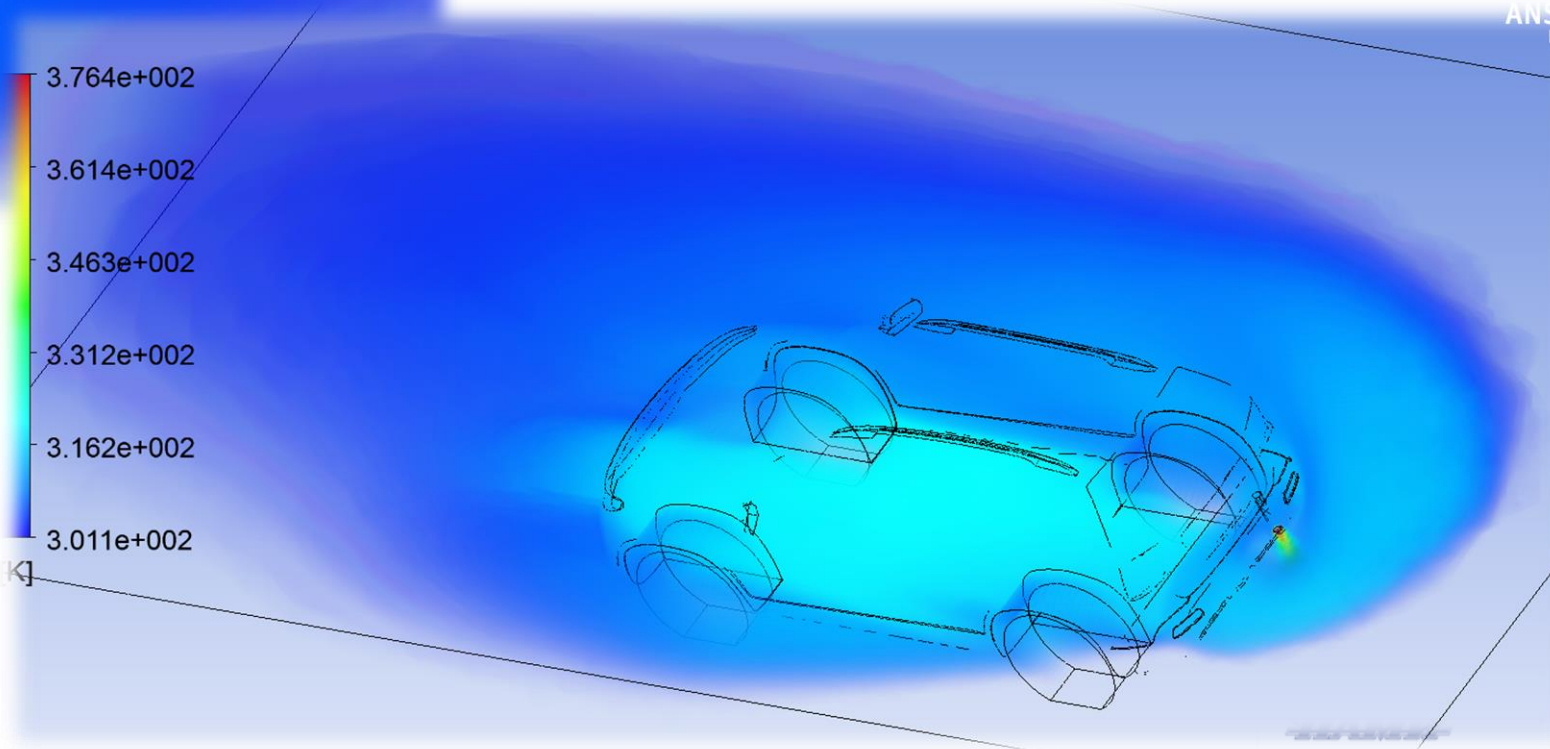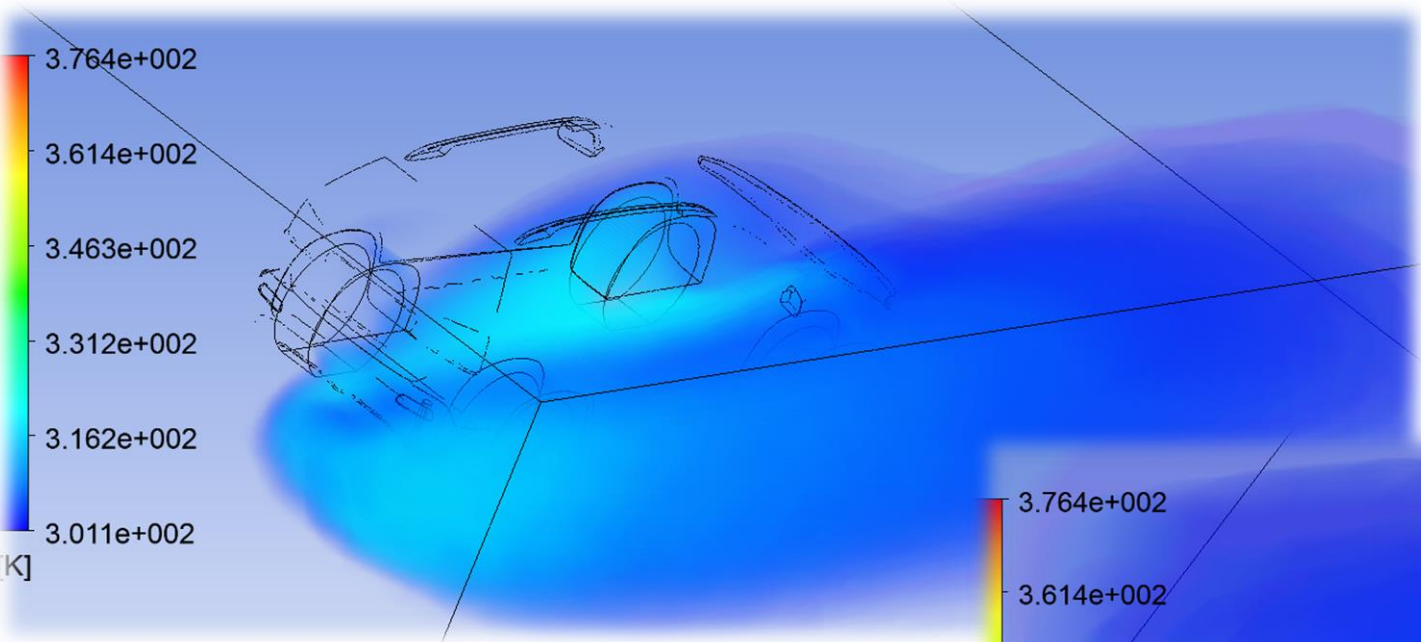# Simulation results

Wind speed: 0 m/s
wind direction 0 deg.

Simulation results

Wind speed: 1 m/s; wind direction 0 deg.

Simulation results
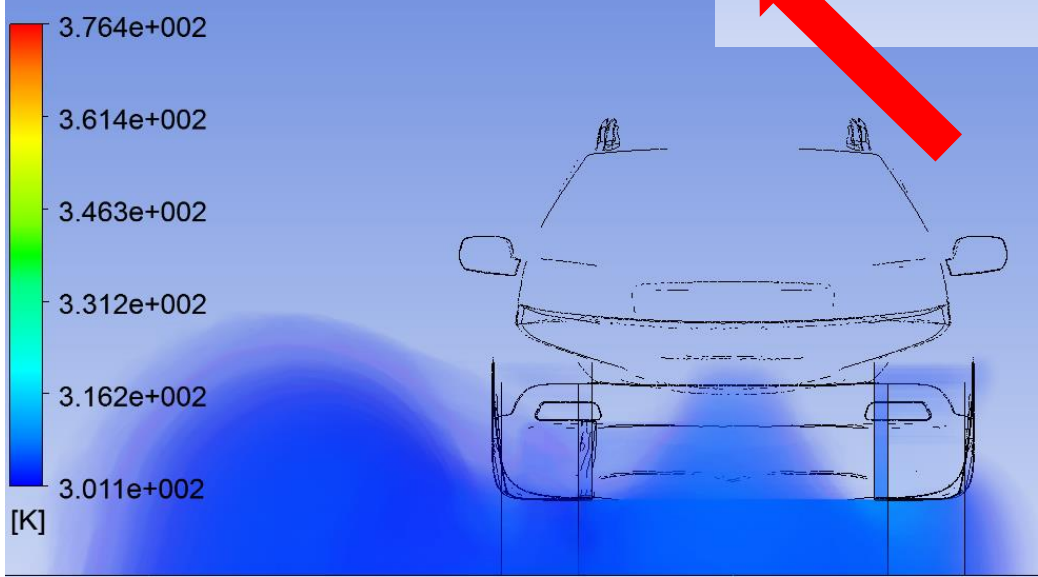
Wind speed: 1 m/s; wind direction 0 deg.

Simulation results

Wind speed: 4 m/s; wind direction 0 deg.

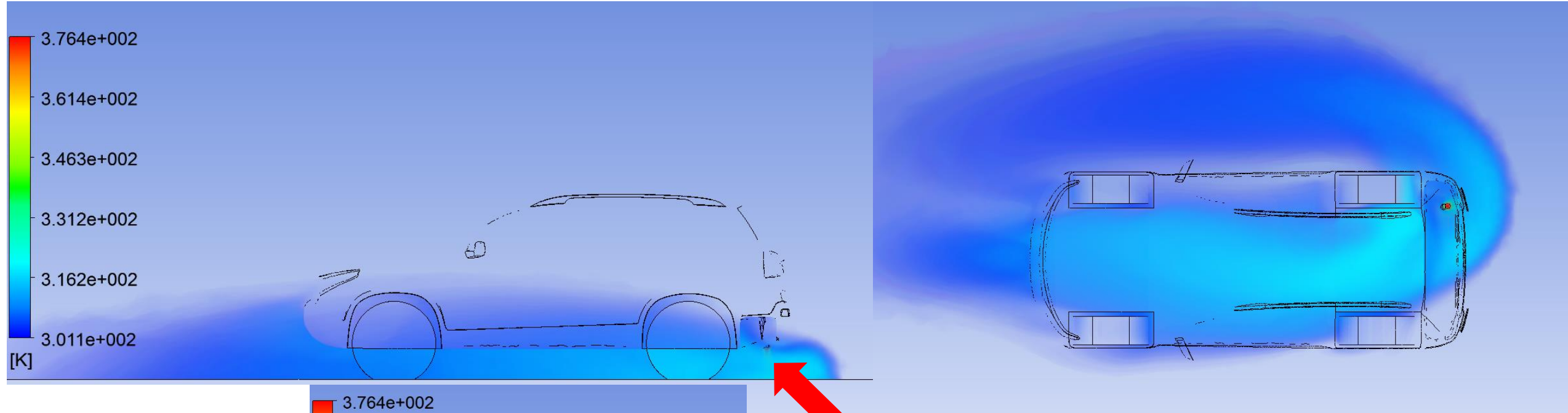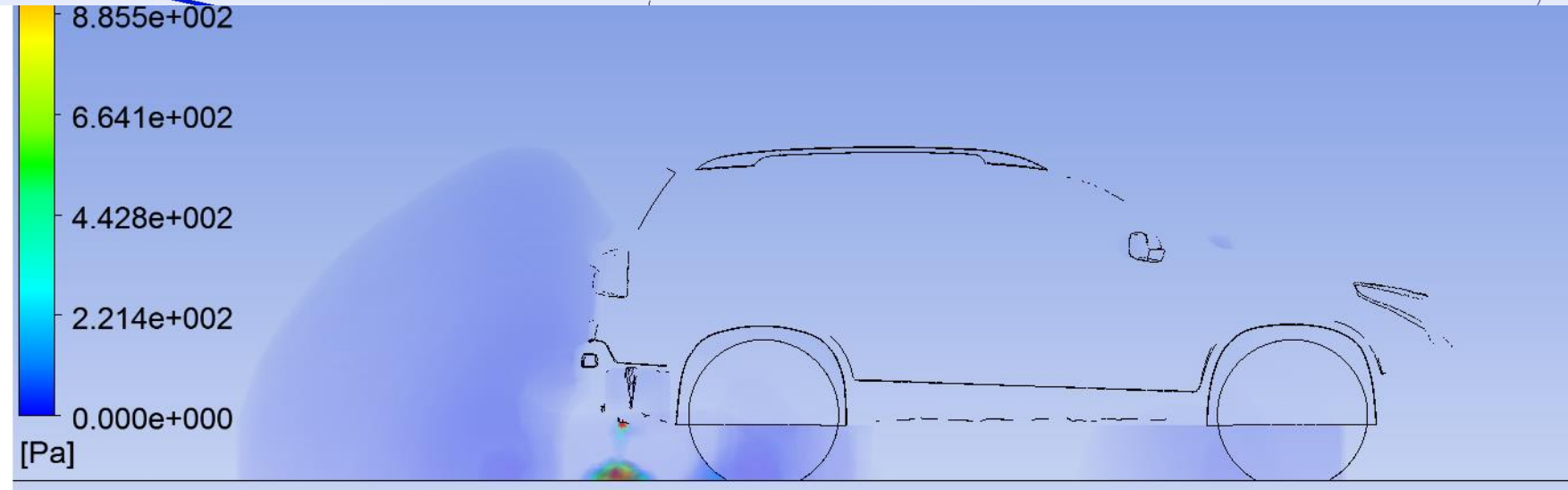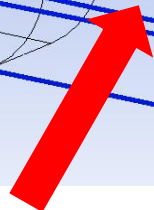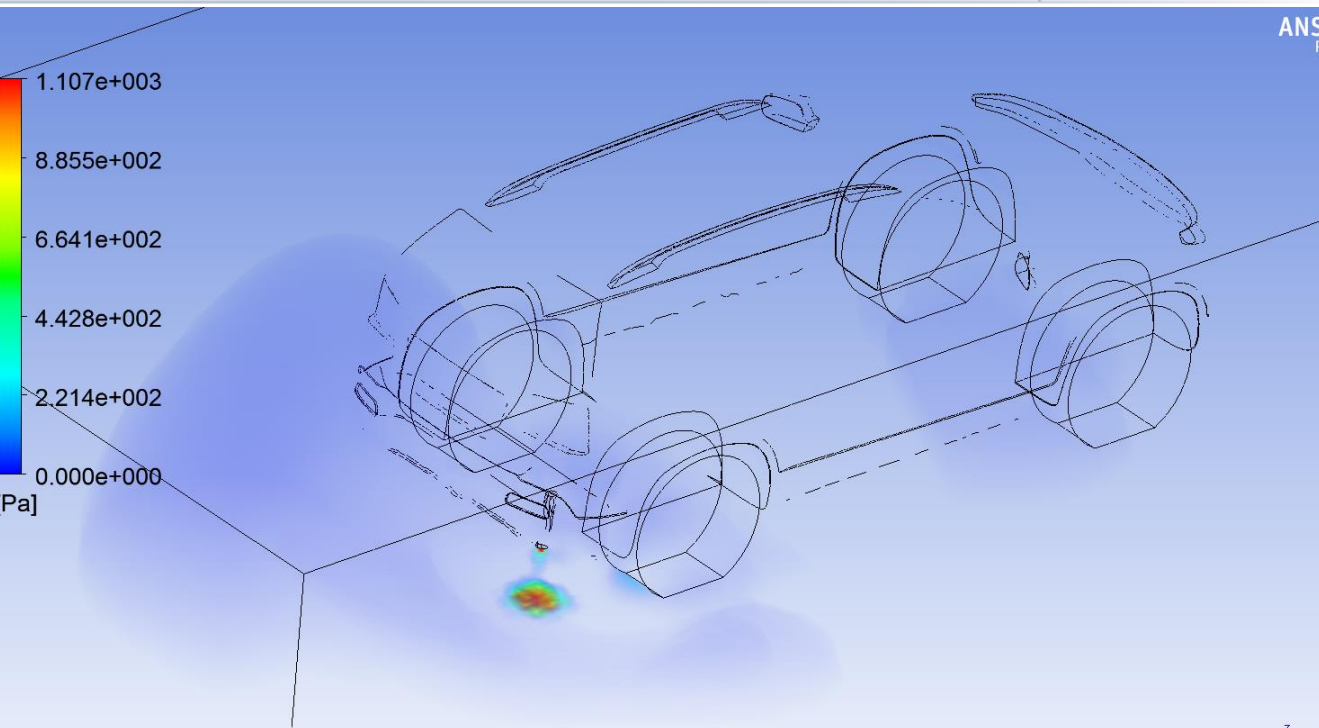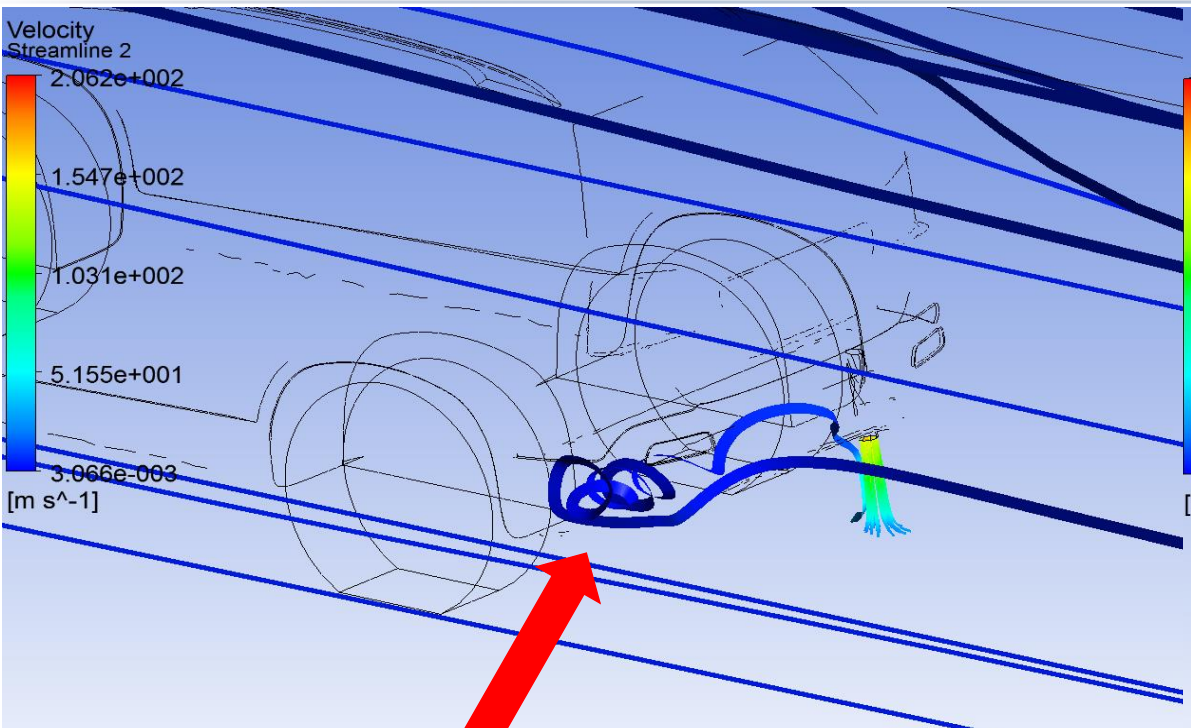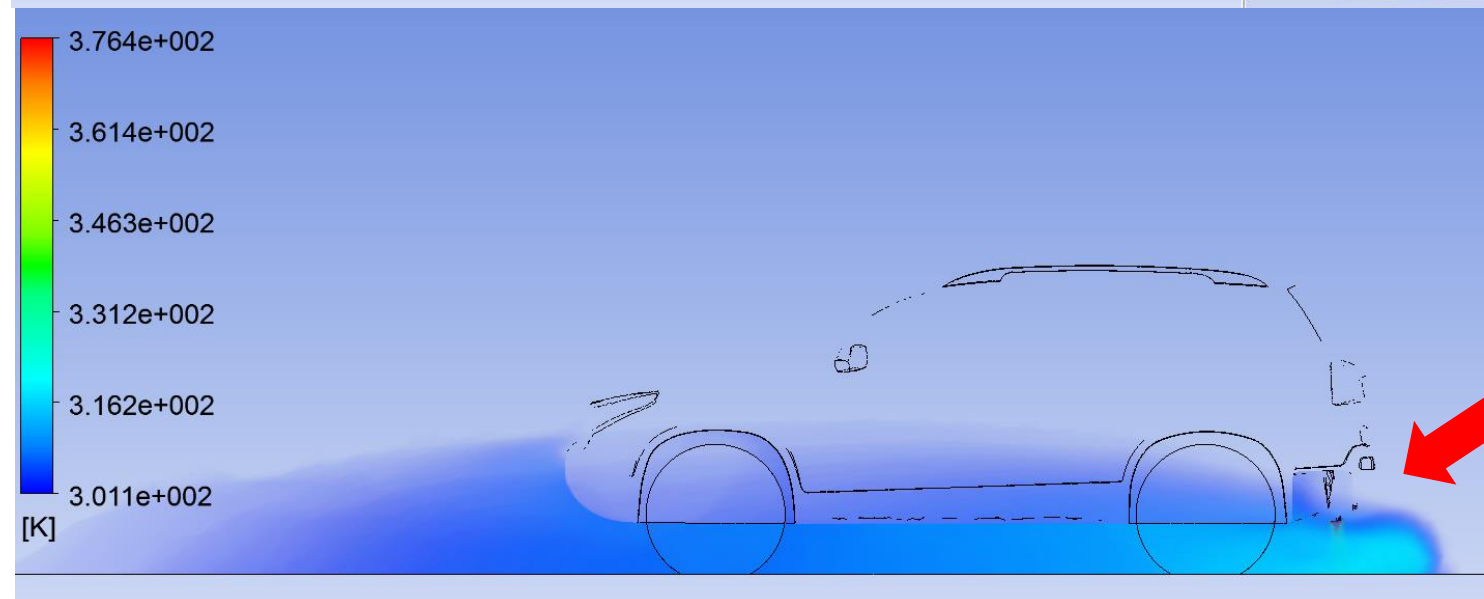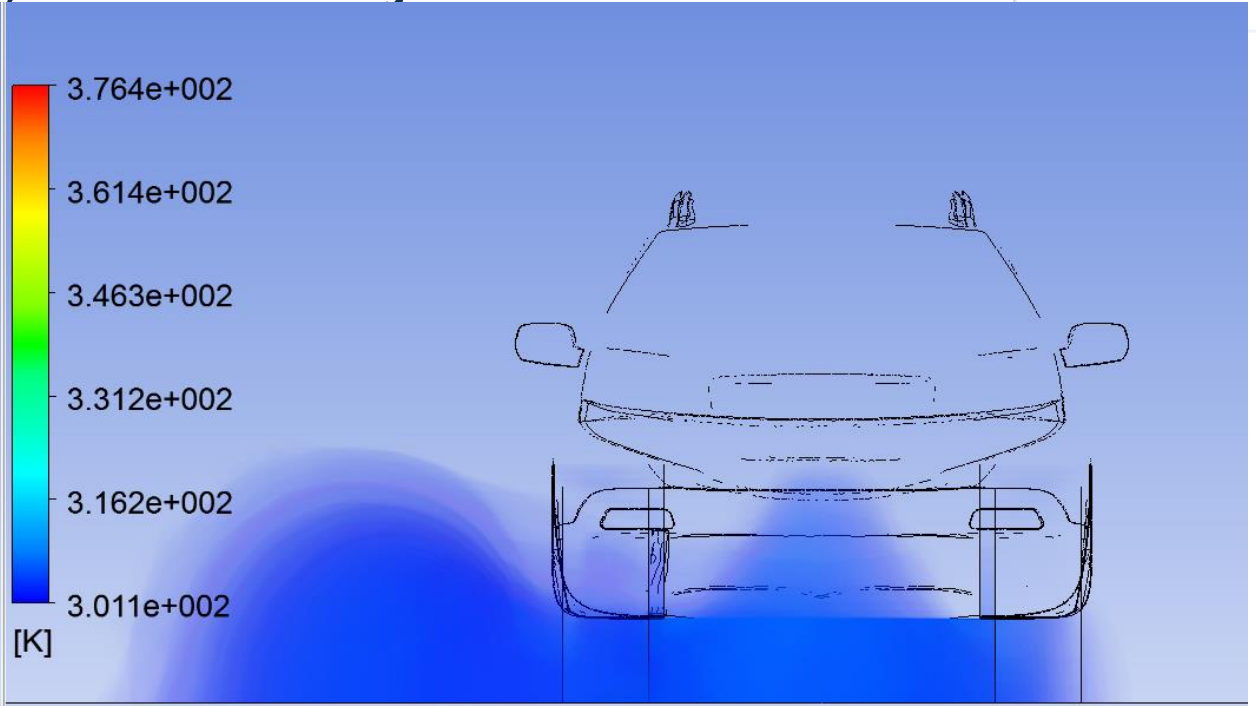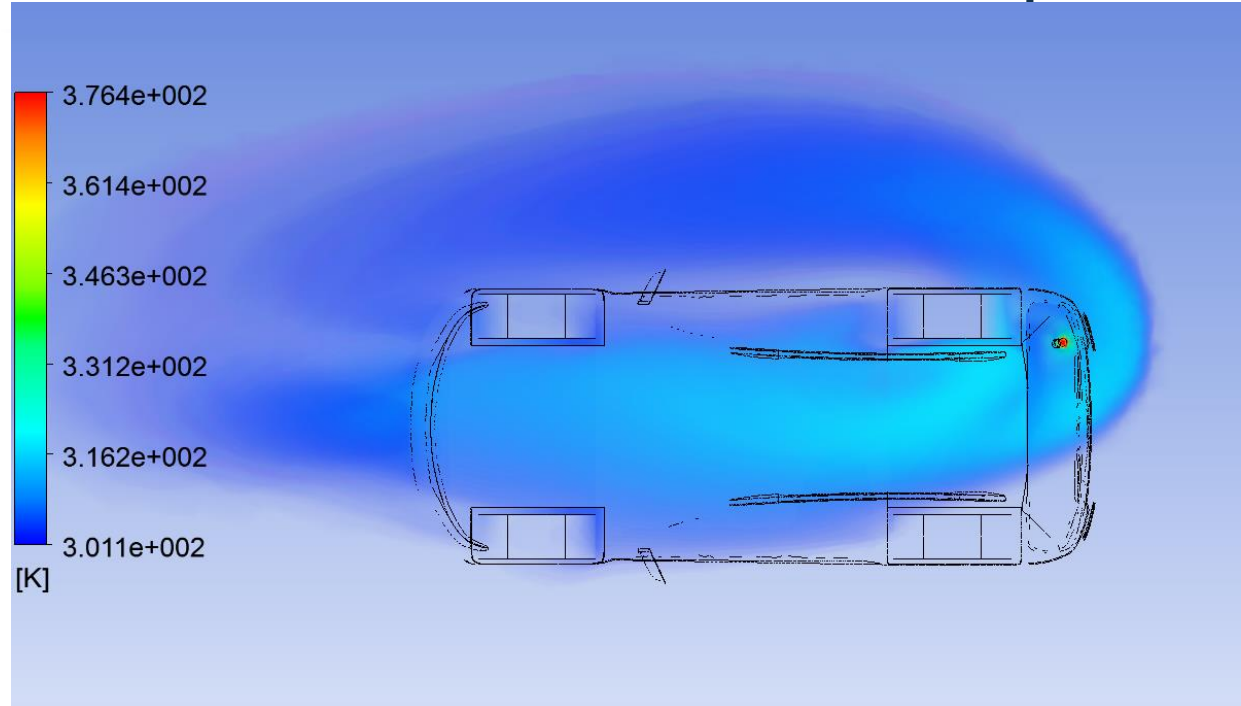# Simulation results

Simulation results

Wind speed: 5 m/s; wind direction 0 deg.

Conclusions

1. The wind speed have significant influence to distribution and concentration of pollutants near ventilation channels of a vehicle.
2. At certain combination of wind speed and ventilation system operation mode local increasing of pollutant concentration inside a vehicle is possible.
3. At high wind speed it is possible local turbulence and pressure increasing near rear ventilation channels.
4. It is planned to continue simulation of pollutant distribution near and inside a vehicle, but more detailed 3D models of a vehicle exterior are needed for that purpose.

Thank you for your attention!