2. Theoretical Tasks: Compression (5 Points)

2.1 Doppler Effect

Consider a car driving with 150 km/h and a person running away from the car with 15 km/h. The car emits lots of different sound effects. How much does the frequency of those sound effects change for the person when the car passes him?

f1 = f * (c - 15 km/h) / (c - 150 km/h)
f2 = f * (c + 15 km/h) / (c + 150 km/h)
fdif = abs(f1 - f2)

2.2 Sound location simulation without headphones

Directional sound can be simulated effectively using headphones. Can this also be done using regular speakers? What are the expected limitations?

This can only possibly work somewhat correctly for a single person, because the sound simulation would have to adjust to the position of the listener.

2.3 Sound reflection data

Considering the data available to a physically based rendering engine – what data can be reused to simulate realistic sound reflections?

Geometry, normal maps and roughness maps – because these data sets define the structure of the environments.