

Urban Physics, 7S0X0

Urban Acoustics, Exercises week 4

Are the following statements right or wrong?

1. Scattering due to atmospheric turbulence leads to decorrelation of sound waves.
2. The acoustic absorption coefficient α of a ground surface can be computed using the surface impedance Z_n .
3. Sound waves are bent towards regions with lower sound speeds (assuming no influence of the wind on sound propagation).
4. Diffraction at the edge of a barrier leads to acoustic energy in the area behind the barrier, where the sound source is not visible.
5. In narrow urban street canyons, the sound level does not decay with increasing distance from the source.
6. The acoustic absorption coefficient α of porous ground surfaces (like grass) usually decreases with increasing frequency.
7. Screening of sound by barriers reduces sound levels for all audible frequencies.
8. The amount of air absorption in dB/m does depend on the wind velocity.
9. The temperature in the atmospheric surface layer usually increases with height.
10. Sound waves are refracted by high wind velocities.
11. In the nocturnal boundary layer, sound waves are bent upwards.
12. Scattering due to atmospheric turbulence increases the air absorption of sound waves.
13. Screening of sound by barriers is most efficient to reduce noise from road traffic vehicles at a low speed.
14. In narrow urban street canyons, sound reduction over increasing source-receiver distance is larger when sound reflection from façades is specular (i.e., mirror-like) instead of diffuse.
15. Scattering due to atmospheric turbulence leads to higher sound levels in acoustic shadow zones.
16. If the wind blows from a source towards a receiver (downwind configuration), with a noise barrier in between, the performance of the barrier is worse than in the absence of wind.
17. The attenuation loss due to the molecular absorption in air is linearly proportional to the sound frequency.
18. Atmospheric turbulence leads to sound pressure levels behind noise barriers that are lower than in the absence of atmospheric turbulence.
19. The sound field due to a direct sound wave (from the source) and its reflection on the ground can lead to a sound level smaller than the level of the direct wave alone.
20. The refraction of acoustic waves by the wind does not depend on the frequency.
21. The amount of air absorption (in dB/m) depends on the molecular composition of air.