Engineering methods are important but limited

- Engineering methods quickly approximate average noise levels for simple geometries.
- Governments, city planners, consultants, and researchers use engineering methods to:
  - Evaluate current noise exposure
  - Predict the impact of infrastructure changes
  - Mitigate excessive noise
- Engineering methods cannot accurately model complex objects, so the potential benefits of complex objects are often ignored.

Objective

To augment engineering method capabilities

- To develop a hybrid method that efficiently models complex shapes and surfaces more accurately.

Approach

Add a correction to the engineering method

- Model the complex object and a simple object using a detailed method (e.g., the boundary element method).
- Store the differences in a table based on source and receiver positions and frequency (six input variables).
- Model the urban scene using an engineering method with an additional attenuation term for the complex object.

Complexities

Obtaining the true correction is difficult to do efficiently

- Interpolating a discrete set of points must accurately represent a very large domain where the number of points is severely restricted by the available computer memory.
- The interpolation is 5-dimensional.
- Reflections and diffractions are simplified to changes in the source and receiver locations.
- For efficiency, the engineering methods assume that different sources of attenuation are independent. The limits of this approximation must be investigated for complex objects.

Conclusion

The hybrid method

- Yields more accurate results than the engineering method for complex objects.
- Requires further validation using additional urban scenes and higher frequencies.

Committee

- Judicaël Picaut, Philippe Jean, Julien Maillard, Fabrice Junker, and Olivier Richoux.

Contact

- matthew.kamrath@cstb.fr