Improvement in broadband noise attenuation with periodic structures on top-edge of noise barriers

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Introduction: The top-edge of a noise barrier can be designed to improve the sound attenuation behind the barrier.

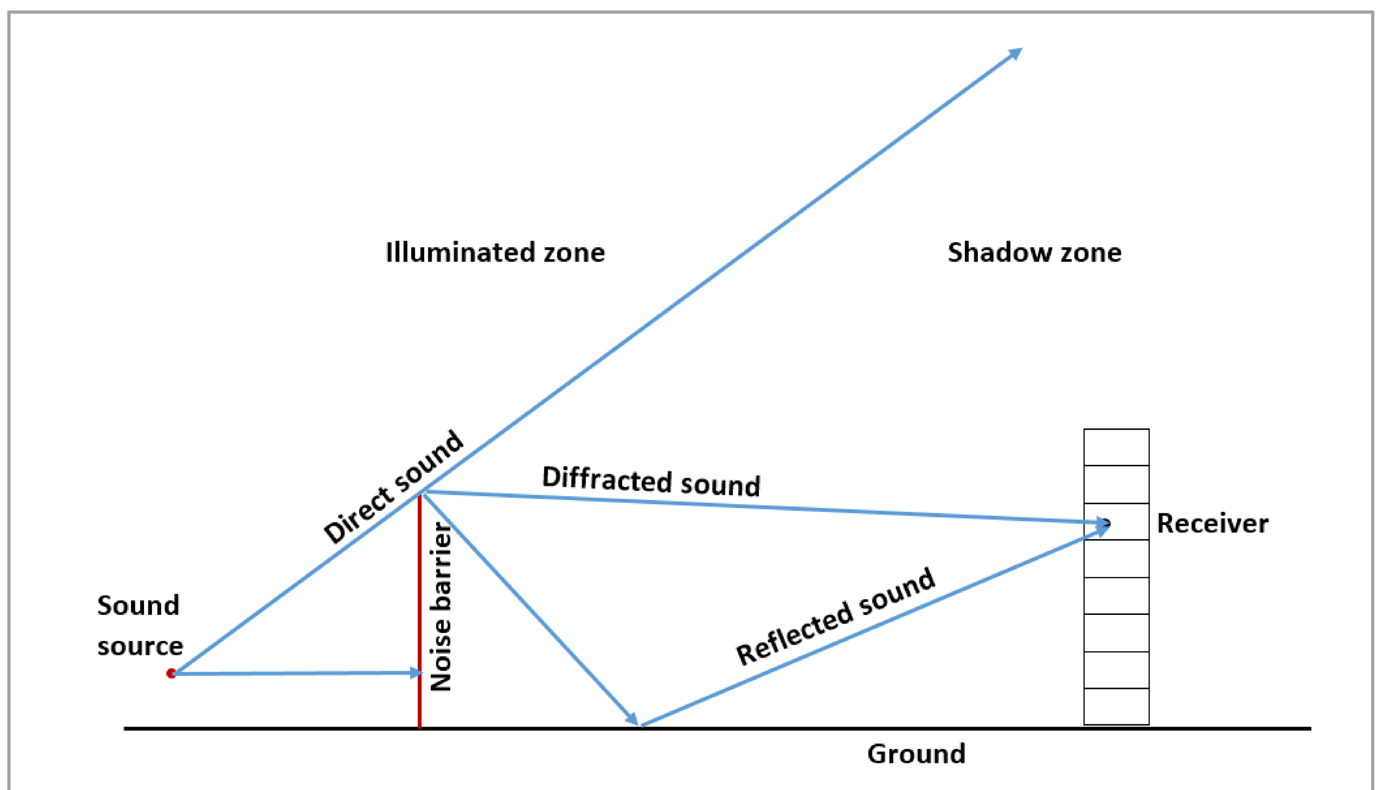

Figure 1. Schematic of sound diffraction from top-edge

Objective: Improvement in sound attenuation over wide frequency spectrum.

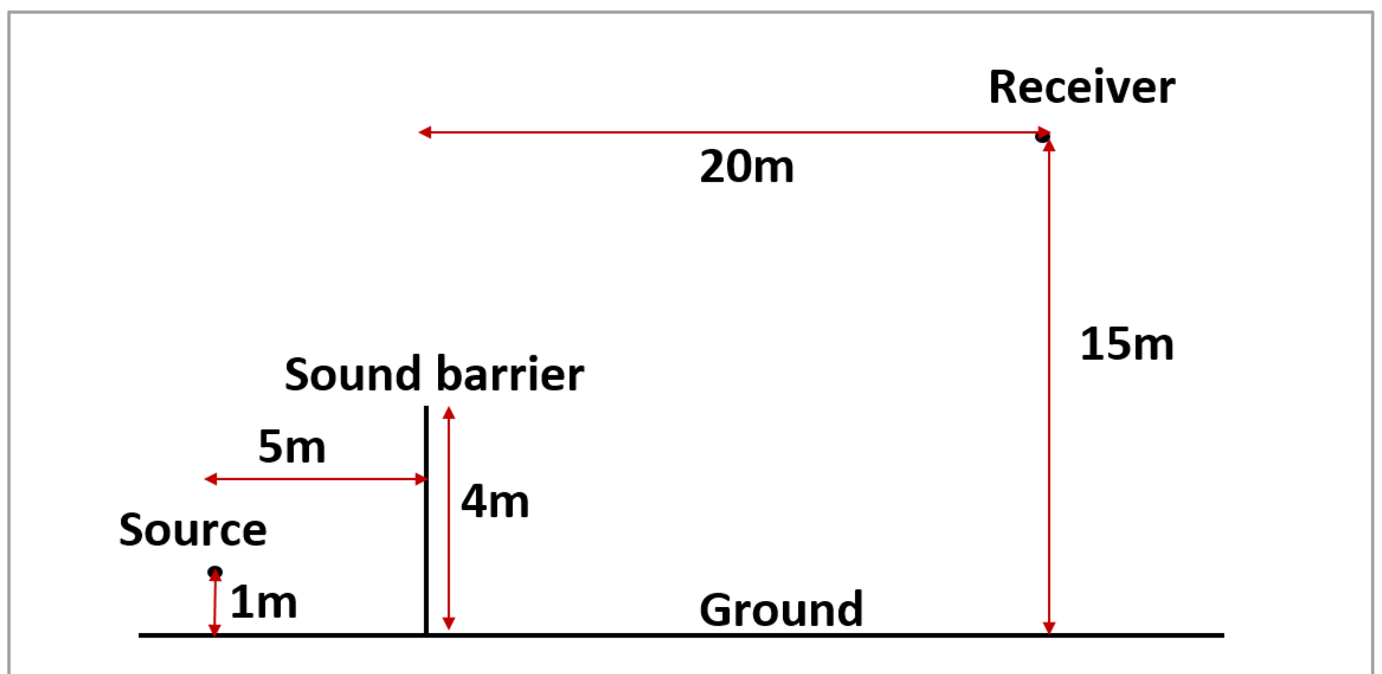

Figure 2. Schematic of the problem setup

Computational Methods: Acoustics solver in 2D frequency domain of Comsol 5.3 has been used in this study.

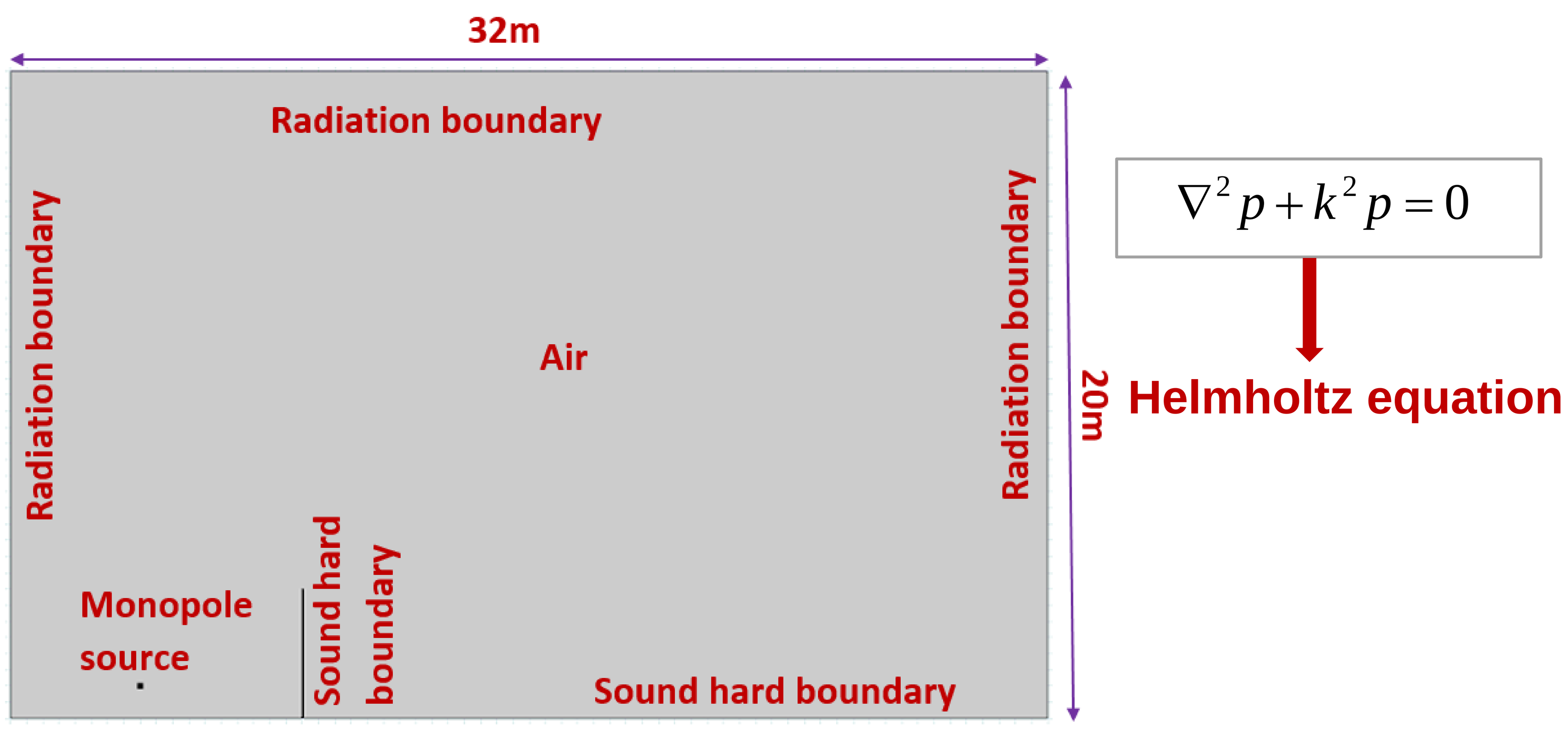

Figure 3. FEM model in Comsol

Conclusions: Barrier can be tuned for a certain frequency bandwidth by selecting appropriate well-size at the top-edge.

A combination of these periodic wells (like QRD) can obtain good attenuation over multiple frequencies.

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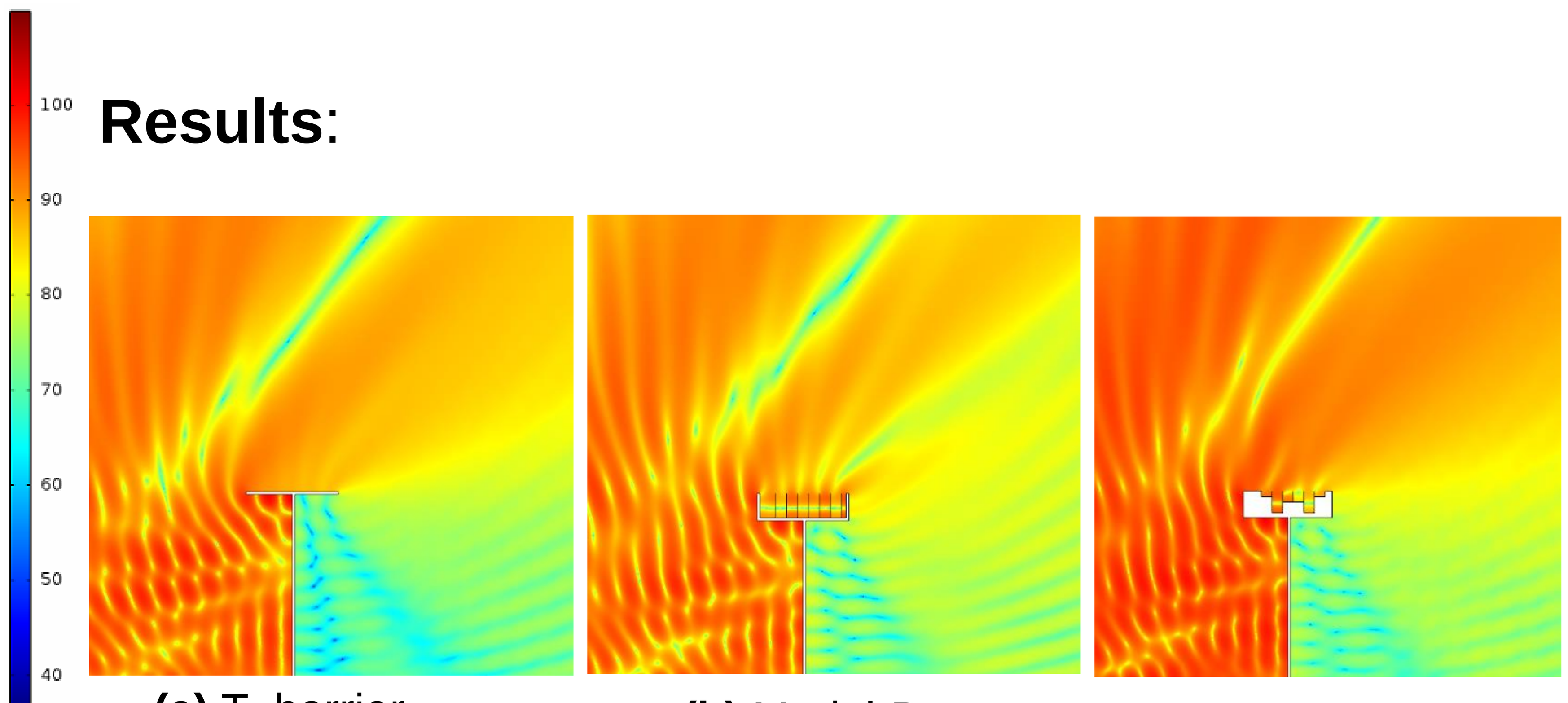
References:

1. Multiphysics, C. O. M. S. O. L. (2013). Acoustic Module–User's Guide.

Results:



(a) T- barrier **(b)** Model-B **(c)** QRD

Figure 4. Sound field near the top edge of selected barriers at 800Hz

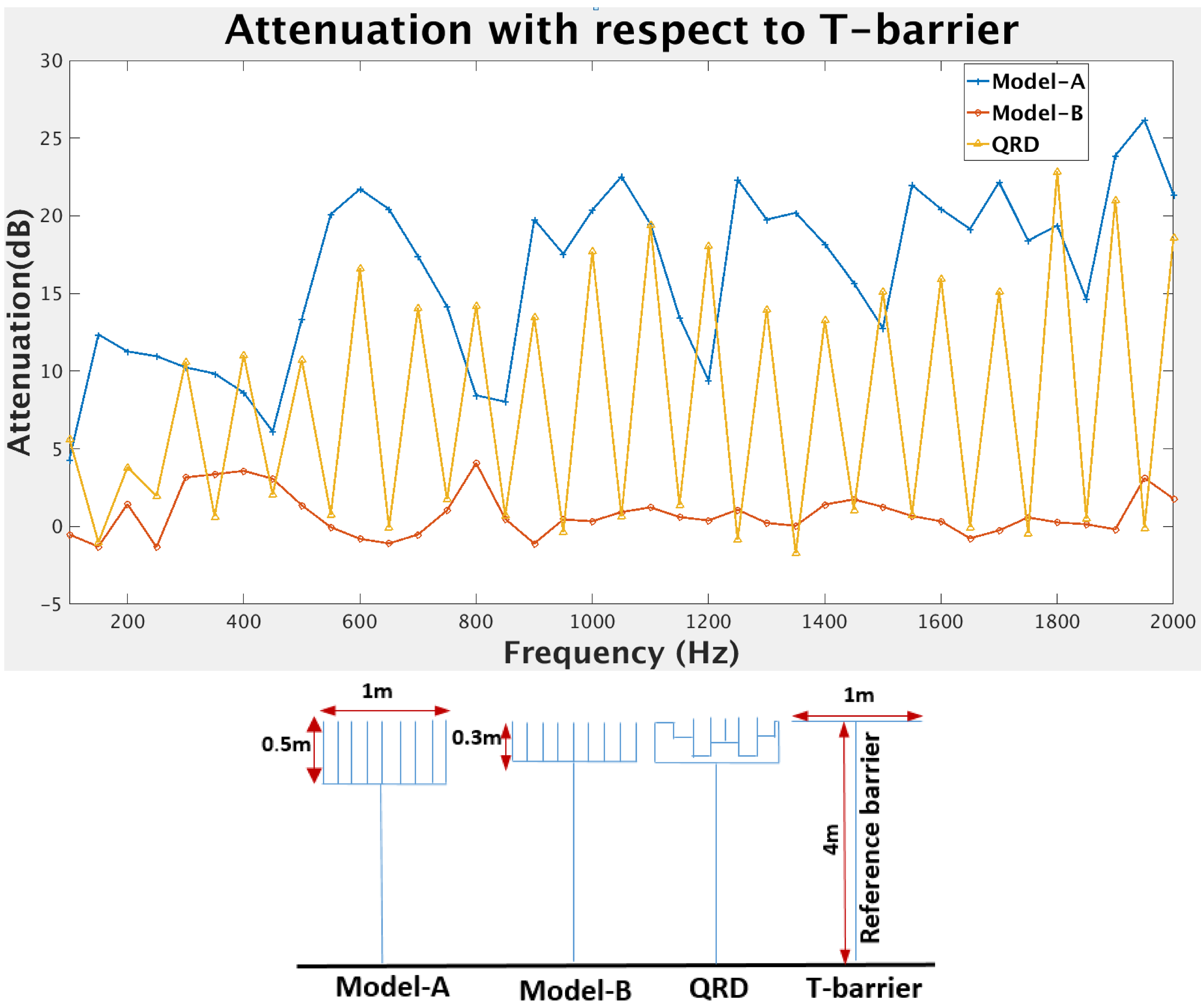


Figure 5. Effect of well-depth on noise attenuation

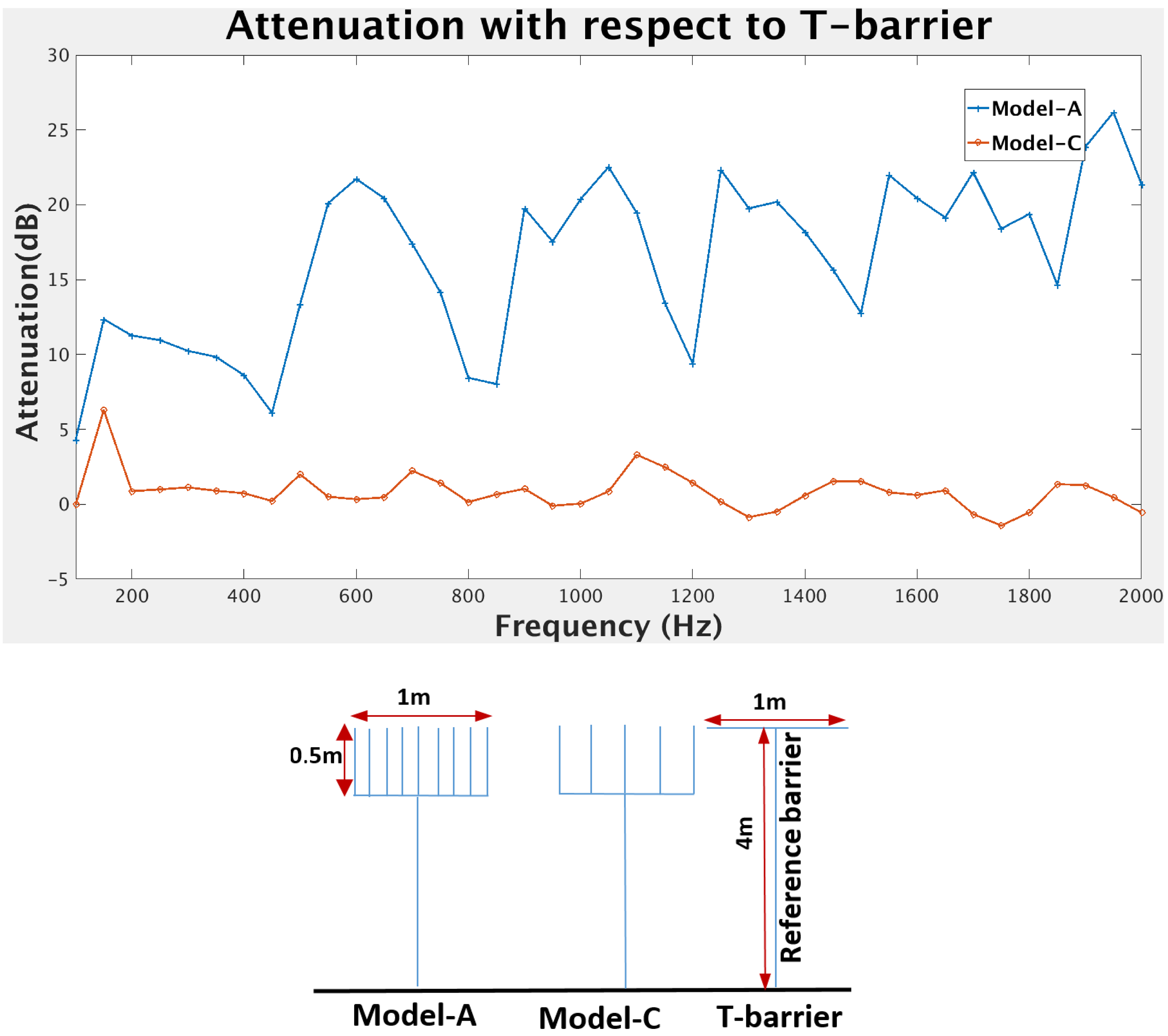


Figure 6. Effect of well-width on noise attenuation

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