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**Time-domain modelling of thermoacoustic devices: Reflections
from the stack**

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Thermoacoustic devices are today mainly simulated using frequency-domain models. Contrary to frequency-domain models, time-domain models may include time-varying boundary conditions and time varying effects. Furthermore, effects like reflections from the stack can be visualised which, in turn, can improve the understanding. The primary aims were: (1) to study the initial behaviour of the acoustic field in a thermoacoustic device using a time-domain method; and (2) to compare the results from the simulations with experiments. Since time-domain techniques are computational expensive, the detailed Finite-Difference Time-Domain (FDTD) method are combined with the quicker Equivalent Source Method (ESM). The acoustic field in the stack, only including viscous effects, was modelled using the FDTD method, and the ESM was used outside the stack. The experimental setup consisted of a loudspeaker connected to a circular tube containing a ceramic stack with rectangular pores. From the results of both the simulations and the experiments, clear reflections from the stack were seen. Since these reflections influence the total acoustic field in thermoacoustics devices, time-domain methods provide useful tools for further development of thermoacoustic devices.