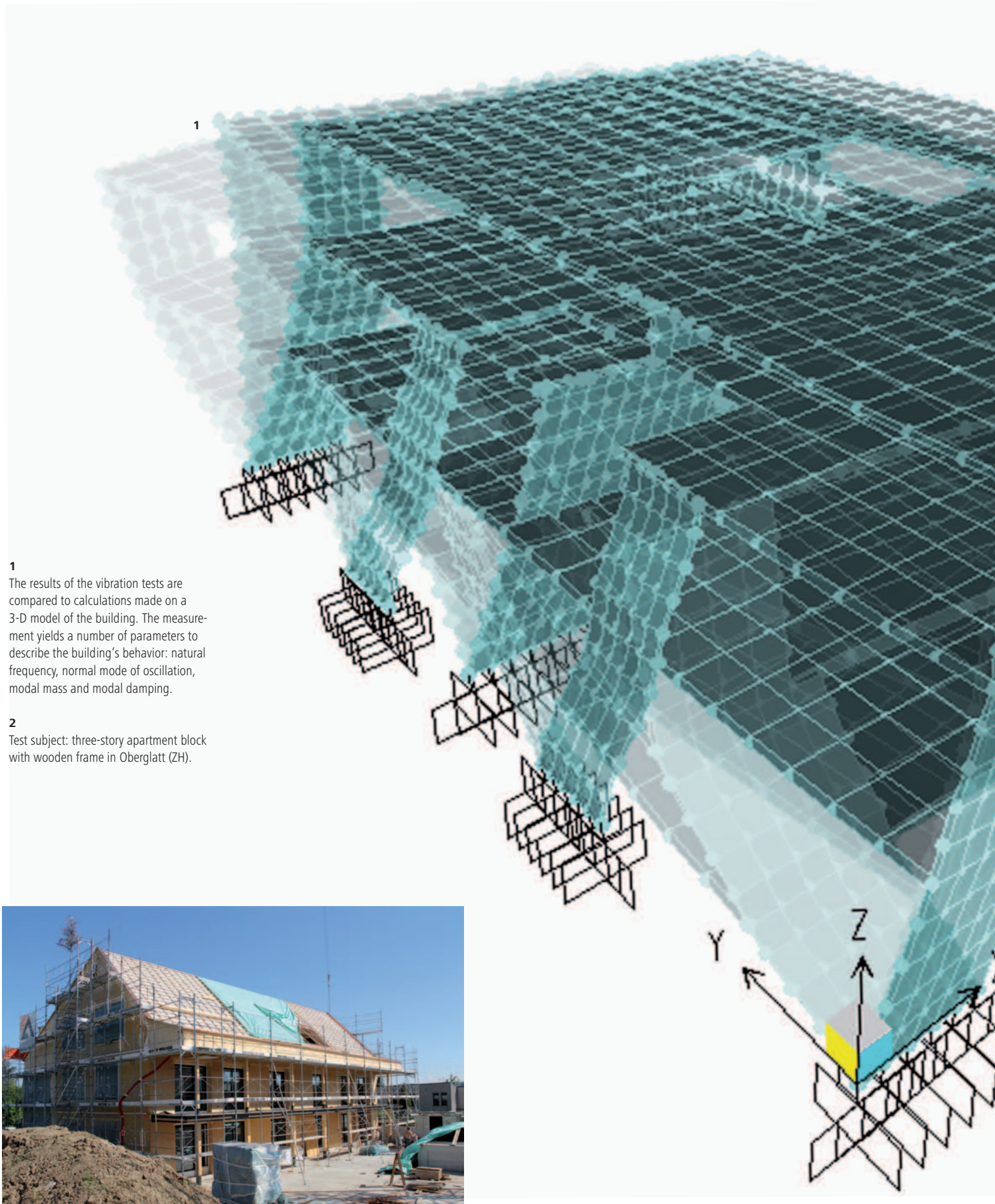
1

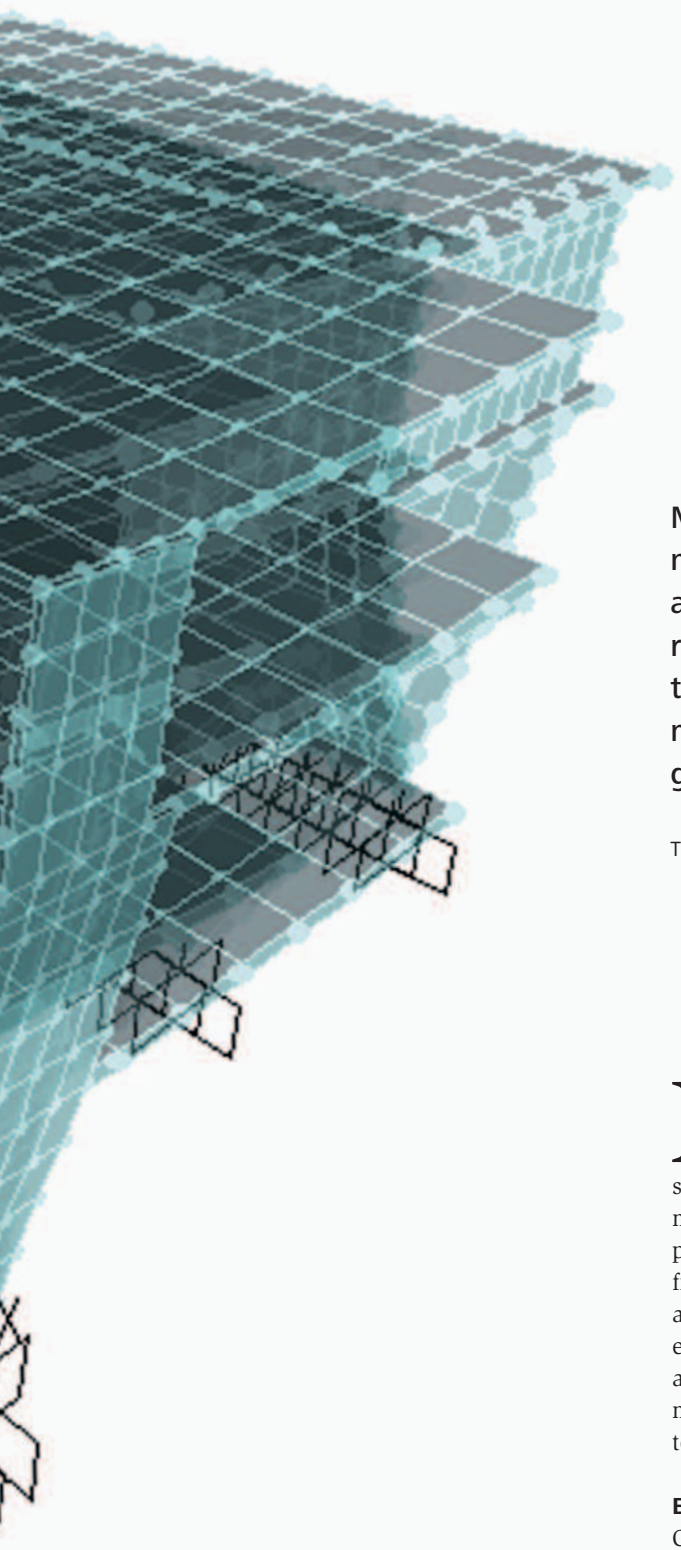


1
The results of the vibration tests are compared to calculations made on a 3-D model of the building. The measurement yields a number of parameters to describe the building's behavior: natural frequency, normal mode of oscillation, modal mass and modal damping.

2
Test subject: three-story apartment block with wooden frame in Oberglatt (ZH).

2

Shaken, not stirred



Multi-story wooden buildings are in high demand. But in order to withstand strong winds and earthquakes the support structure requires reinforcement. Using a large shaker an Empa team makes a multi-story house vibrate. The measurements help architects and structural engineers to optimize planning and construction.

TEXT: Martina Peter / PICTURES: Empa

It took three rounds for Empa's large Saurer truck to deposit its cargo at the construction site in Oberglatt: a two-ton shaker. Far from the public gaze, an unusual scientific experiment was being set up. It was aimed at optimizing planning and dimensioning of multi-story wooden houses thanks to better data from practical experience – and finding low-cost solutions. Project leader René Steiger from Empa's "Structural Engineering" laboratory explains what it is all about: "When supporting structures are being planned and erected, structural engineers are confronted with the very same problems as ordinary mortals putting a bookshelf together: Leaving out the metal cross at the back makes the shelf unstable, and it starts to totter perilously even with the gentlest of pushes from the side".

Experimental investigations are (still) lacking

Of course, a mere metal bookshelf cross is not sufficient for the apartment block that was examined. A building made from a prefabricated wooden frame elements and nailed-on oriented strand board and plasterboard panels needs rigidity to withstand strong wind gusts and earthquakes. To ensure this, structural engineers can fall back on various solutions: One either installs additional supporting

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