

IMPACT ECHO METHOD

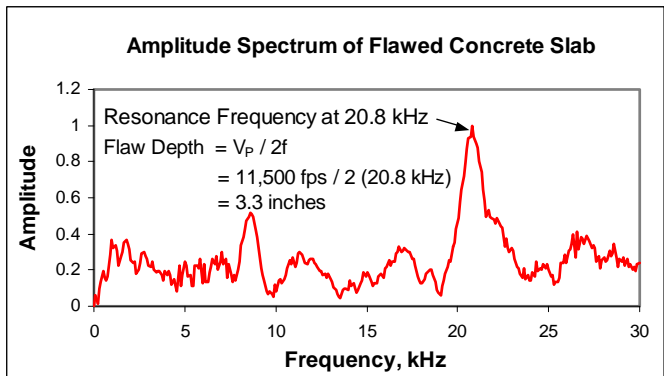
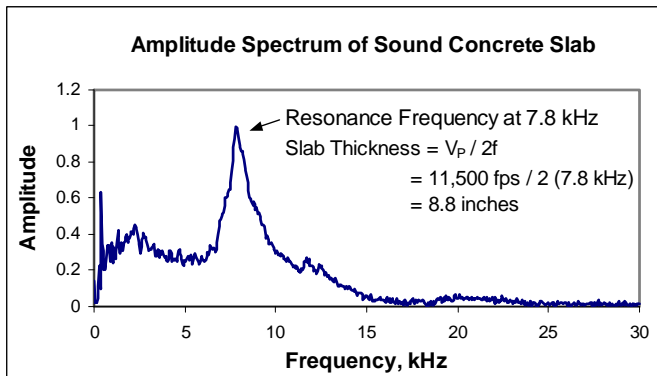
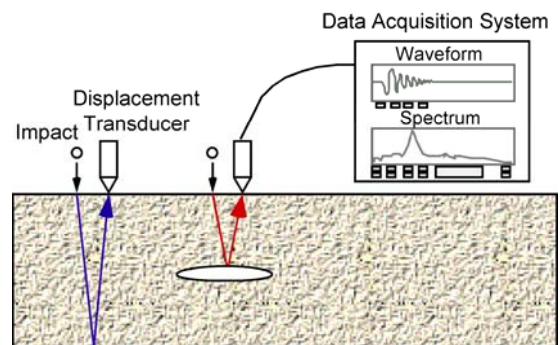


Overview

Impact Echo is a method for nondestructive evaluation of concrete and masonry. It is based on the use of impact-generated compression waves that travel through the structure and are reflected by internal flaws and external surfaces. Impact Echo can be used to measure the thickness of slabs, plates, columns and beams, and hollow cylinders. It can also be used to determine the location and extent of flaws such as cracks, delaminations, voids, honeycombing and debonding in plain, reinforced and post-tensioned concrete structures. Voids in the subgrade directly beneath slabs and pavements are easily detected through Impact Echo testing.

Procedure

Impact Echo testing consists of measuring both the time record and frequency spectrum associated with a mechanical impact on the surface of a structure. As stress waves propagate through the structure, they reflect off internal and external boundaries and cause periodic displacements on the surface. These motions are monitored by a transducer and digitized. The waveform is transformed into the frequency domain, so that the periodicity of stress-wave arrivals can be accurately determined. As part of Impact Echo testing, direct measurements of compression (P-) wave velocity are also made. Given the P-wave velocity and the arrival period (or frequency), the depths to internal flaws or external boundaries are calculated.



Key Benefits

The Impact Echo method offers significant advantages. It is nondestructive and requires only one surface of the structure to be exposed. Because of the speed of Impact Echo measurements, a larger area can be tested at greater resolution and lower cost than invasive methods.

Impact Echo testing has many applications, including:

- Quality control programs, such as measuring pavement thickness or assessing pile integrity
- Routine maintenance evaluations to detect cracks, voids, or delaminations in concrete slabs
- Delineate areas of damage and corrosion in walls, canals, and other concrete structures
- Assess quality of bonding and condition of tunnel liners