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Operational transfer path analysis: comparison with conventional methods

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Transfer Path Analysis describes how sound and vibration propagates through complex structures. The correct determination of transfer coefficients between sources and receivers is essential for a high quality analysis. Conventional methods use artificial excitations (forces or volume velocities) to evaluate transfer functions. Therefore, they do not consider the influence of different load conditions on the transfer function behaviour of complex structures. In a second step, operational data (vibrations or sound pressures) are applied to the transfer functions to calculate the different path contributions.

In order to overcome these restrictions, transfer coefficients can be evaluated directly from operational data. Thus, the actual load conditions are taken into account and the quality of transfer characteristics is improved. The relation between simultaneously measured data of sources and receivers can be derived by statistical methods. Principal Component Analysis is used to separate the total signal into individual path contributions, while operating on airborne and structure-borne contributions simultaneously.

Operating in the time-domain gives direct access to auralisation and in-depth analysis of dominant path contributions. This new single-step approach has been proven to generate more precise analysis results within a much shorter testing time.