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EXPERIMENTAL DETERMINATION OF THE VIBRATION PATHS ONBOARD AND CONTRIBUTE OF THE VIBRATION LEVELS OF A SOURCE TO A TARGET – APPLICATION OF THE TRANSFER PATH ANALYSIS TECHNIQUE ONBOARD A CRUISE SHIP -

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The aspects related to the vibrational behaviour of the ship are significant for issues relating to possible fatigue stress on structure, heathy and onboard operators' comfort reasons. Nowadays, this is even more significant due to the need of keeping the hull weight that leads to plan increasingly lightweight and less rigid structures and therefore more likely to experience vibrational and vibro-acoustic noise phenomena.
In this field, it is substantial the use of the Transfer Path Analysis (TPA) technique which is an experimental methodology that allows to study the phenomena of transmission of the vibration energy also to physical systems characterized by high levels of complexity with several sources working simultaneously on the same field.
Traditional techniques do not allow the spatial mapping of energy paths which remain unknown also after the acquired data elaboration. Otherwise, TPA allows to identify the paths and contributions traceable to vibration sources.
During applied research, in a first approach applied on a naval cruise, three main sources onboard have been considered: the propeller and the electric and diesel engines.
The application of Transfer Path Analysis allows to identify the vibration energy transmission paths and to verify that no other significant path is left out. These are the transmission ways through which the vibration is transferred from the source to the receivers: in the case of the engine and the propeller both transmission paths start from the foundations and arrive to the cabins through decks and main\secondary structures. Sources, paths and receivers were properly characterized experimentally for the technique application.
The operative calculation of the vibration response corresponding to the targets, allowed a validation of the method through a comparison between the calculated vibration and the full execution of the procedure.
The development of this methodology allowed to refine the forecasted calculation methods of the vibrations and the structural noise in the planning phase, and to perform refined experimental measures to solve issues related to structural noise propagation and to vibration onboard.

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