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Noise reduction strategies for a light metro rail traction system

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Inside the paper the vibro-acoustic characterization of a light rail vehicle is presented, with special reference to the traction noise emission identification. As a first step, on board measurements and pass by measurements, were performed in order to separate traction noise from rolling noise; these test revealed the electrical engine, as the most relevant sources at low speed. The electrical engine has then been characterized during specific laboratory test and innovative noise control solution were proposed to be tested. The first one could be a modification of inverter algorithm; this trying to reduce the influence of most relevant acoustic tones. This approach is essentially based on a software modification of the PWM algorithm through which modify the engine's spectral response. The second possible tested approach involved the enclosure of the engine in a sort of semi-active skin panels co-located at short distance from the engine; it has been demonstrated that this approach, by the merging of passive and active peculiarities, potentially lead to a wide frequency range application area. Following laboratory tests, the PWM solution was also decided to be implemented during "on board" test; a wide set of experimental results will be presented and discussed.