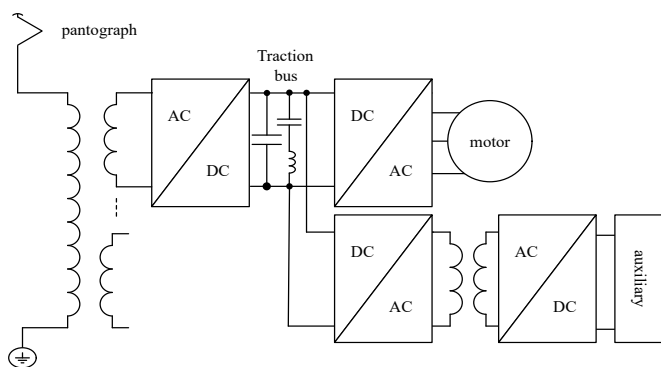




2F Active Filter for Traction Drive

CONTEXT

The current trend in railway applications is to reduce the volume and weight of on-board converters, to maximise the space for passengers. However, on AC catenary, the single-phase AC to DC conversion generates a power oscillating at twice the network frequency, commensurable to the traction power. Filters are thus necessary to mitigate the AC currents on the motor side. This function is generally carried out by a bulky capacitor on the DC traction bus with the possibility of a voluminous LC passive filter in parallel, especially for 16.7 Hz applications.



APPLICATION DOMAIN

On-board converters on AC railway infrastructure

ADVANTAGES

- On-board weight reduction
- On-board volume reduction

TRL SCALE

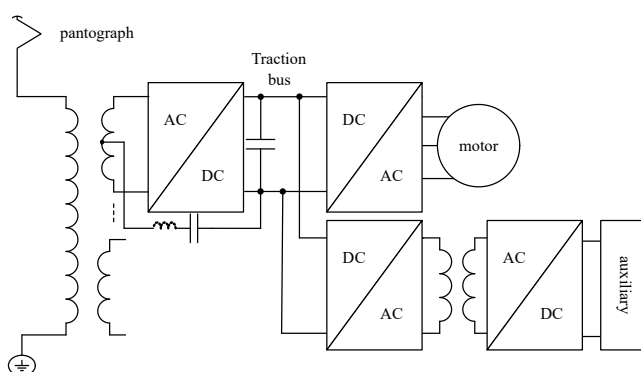


DELIVERABLES

Patent application FR1907945

TECHNOLOGY DESCRIPTION

SuperGrid Institute has patented an active filtering solution, buffering the AC power generated by railway on-board converters supplying traction DC buses through a low frequency transformer and rectifiers. The volume and weight of the passive components used to filter the oscillating power are drastically reduced compared to a passive filter.



The solution, designed by SuperGrid Institute, is based on the principle of power pulsation buffers. The idea is to connect an additional filtering capacitor between the traction bus and the mid-point of the low frequency transformer, potentially through an added inductance. Thanks to an adapted control, the differential and common modes of the rectifier can be regulated independently. The differential mode is controlled to transfer the traction power from the railway infrastructure to the motors, while the common mode is regulated to charge and discharge the filtering capacitor with the AC power. As the filtering capacitor is only sized to buffer the rippling power and not to maintain the traction bus voltage, its size can be highly reduced compared to a passive capacitor on the traction bus.