Simulation of a SOFC/Battery powered vehicle - DTU Orbit (17/01/2019)

**Simulation of a SOFC/Battery powered vehicle**

Solid oxide fuel cells (SOFCs) have received attention in the transport sector for use as auxiliary power units or range extenders, due to the high electrical efficiency and fuelling options using existing fuel infrastructure. The present work proposes an SOFC/battery powered vehicle using compressed natural gas (CNG), liquefied natural gas (LNG) or liquefied petroleum gas (LPG) as fuels. A model was developed integrating an SOFC into a modified Nissan Leaf Acenta electrical vehicle and considering standardized driving cycles. A 30 L fuel tank and 12 kW SOFC module was simulated, including a partial oxidation fuel reformer. The results show a significant increase of the driving range when combining the battery vehicle with an SOFC. Ranges of 264 km, 705 km and 823 km using respectively CNG, LNG and LPG compared to 170 km performed by the original vehicle were calculated. Furthermore, a thorough sensitivity analysis was carried out.

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