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Fuel cell hybrid electric air-cushion tracked vehicle for peat swamp

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Abstract

A prototype of a fuel cell (FC) hybrid electric air-cushion tracked vehicle of 4.96 kN ground contact area of 0.85 m² including 0.20 m² contact area of the air-cushion for the peat swamp of normal ground pressure in the range of 7–8.5 kN/m² has been developed to overcome the problems associated with an internal combustion engine (ICE) power tracked vehicle. The vehicle power system has an FC terminal voltage of 60 V, 3.6 kW and 500 g of hydrogen mini tank and battery of 60 V and 5.2 kWh. The FC and batteries are connected in parallel with a DC/DC converter to optimum fuel efficiency and fuel cell longevity. Consecutively, an adaptive neuro-fuzzy intelligent system (ANFIS) is used to switch power from FC to battery for the vehicle sinkage >70 mm in milliseconds for high acceleration and to prevent the vehicle from excessive sinkage, and battery to FC switch for sinkage <70 mm. The vehicle is able to travel 31 km using FC hybrid power system. Copyright © 2024 Inderscience Enterprises Ltd.

Author Keywords

adaptive neuro-fuzzy intelligent system; air-cushion tracked system; ANFIS; electric swamp peat vehicle; fuel cell hybrid power system; vehicle mobility

Index Keywords

Air cushioning, DC-DC converters, Fuel cells, Intelligent systems, Peat, Tracked vehicles, Wetlands; Adaptive neuro-fuzzy, Adaptive neuro-fuzzy intelligent system, Air-cushion tracked system, Electric swamp peat vehicle, Fuel cell hybrid power system, Hybrid power, Peat swamps, Vehicle mobility; Fuzzy inference

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