Journal of Industrial and Management Optimization

JIMO, 22(12): 6709–6738.
DOI:10.3934/jimo.2026224
Received: 16 September 2026
Revised: 03 November 2026
Accepted: 05 November 2026
Published: 20 November 2026

https://www.aimspress.com/journal/jimo

Research article

Refined distributional soft actor-critic approach for optimal energy management in hybrid mining trucks

Xinxin Zhao[1], Xingrui Wen[1], Menglei Liu[1], Jingliang Duan[1], Lifang Zheng[1,*] and Nasser Lashgarian Azad[2]

1 School of Mechanical Engineering, University of Science and Technology Beijing, Beijing 100083, China
2 Department of Systems Design Engineering, University of Waterloo, Waterloo, ON N2L 3G1, Canada

*** Correspondence:** E-mail: zhenglifang@ustb.edu.cn; Tel: 010-62332557.

Appendix A. Nominal vehicle parameters

Table A1. Nominal vehicle and component parameters.

Component	Parameter	Nominal value
Vehicle	Total modeled mass	113,000 kg
Vehicle	Wheel dynamic radius	0.837 m
Vehicle	Final reduction ratio	22.07
Vehicle	Drag coefficient / frontal area	0.65 / 7.5 m2
Vehicle	Rolling resistance coefficient	0.025
Diesel engine	Maximum power / torque / speed	505.7 kW / 2950 N m / 2100 r/min
M/G1	Maximum power / torque / speed	180 kW / 1600 N m / 3000 r/min
M/G2	Maximum power / torque / speed	216 kW / 3000 N m / 3500 r/min
Planetary sets	K1 / K2 / K3	2.14 / 2.14 / 3.46
Battery	Nominal capacity / voltage	158 Ah / 608 V

Battery values are nominal ratings; the electrical model uses SOC-dependent open-circuit-voltage and resistance maps.

AIMS Press

© 2026 the Author(s), licensee AIMS Press. This is an open access article distributed under the terms of the Creative Commons Attribution License (https://creativecommons.org/licenses/by/4.0)