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Structural parameters optimization of a tubular permanent magnet linear machine for regenerative suspension

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The regenerative suspension can effectively recover the vibration potential energy of the vehicle suspension, thus has broad prospects in application. In this paper, a tubular permanent magnet linear motor with the Halbach array magnetic pole is analyzed. The magnetic field analysis method of the excitation source separation is proposed, and then the transient analytical model of output electromagnetic force and the external circuit characteristic under displacement excitation is established. A modified particle swarm optimization algorithm is adopted to optimize the structural parameters. By comparing with the finite element analysis, the correctness of the proposed analytical model and the structural parameters optimization are verified. This work lays the theoretical foundation for extensive application of regenerative suspension.

Biography

Hailong Zhang has received his BS degree in Electrical Engineering and PhD degree in Physical Electronics from the School of Electrical & Automation Engineering, Nanjing Normal University, Jiangsu, China, in 2010 and 2016, respectively. From 2017 till now, he was a Post-Doctoral Research Fellow with the School of Physics and Technology, Nanjing Normal University. He is currently a Lecturer in the School of Electric and Automation Engineering, Nanjing Normal University, Jiangsu Province. His current research interests include dynamical analyze and control of MR suspension and vibration power regeneration.

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