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Liquid nitrogen level detection method for the safe operation of onboard cryostats of high-temperature superconducting maglev vehicles under vibration condition

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For the safe operation of high-temperature superconducting (HTS) maglev vehicles, the liquid nitrogen level of the onboard cryostat should be monitored in real-time during the whole running process. The previous liquid nitrogen level detection method was proposed by using platinum resistance sensors as testing equipment and estimating the liquid level by threshold value judgment. However, the fluctuation of liquid nitrogen level causes great disturbance for the liquid level detection during the running vehicle, which leads to the false level by the previous detection method. To eliminate the interference caused by liquid nitrogen level fluctuation, the state estimation theory of using particle filter algorithm was employed in this paper to process the data. The real-time measurement results illustrate that this method is able to meet the requirements of the liquid nitrogen level detection with high precision, and a simple hardware is valuable for the practical applications of the HTS maglev vehicle.

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