Abstract

The superconducting maglev is a super high-speed transportation system based on the electrodynamic suspension and linear synchronous motor propulsion. The superconducting maglev vehicles have on-board magnets using metallic superconducting wire cooled with liquid helium. These technologies enable a super high-speed operation with a lower noise and a higher efficiency. Since 1997 the superconducting maglev system has been tested at Yamanashi Test Line in Japan, aiming at its future practical application. The length of the current test track is 42.8 km. The maximum speed of 603 km/h was recorded on April 21, 2015. At the end of February 2019, the travel distance reached 2.76 million km. The current master plan for the technology development includes the following key technology items: low-cost and efficient maintenance, high-temperature superconducting magnets, passenger comfort, etc. The superconducting maglev system will be used for Chuo Shinkansen, the Tokaido Shinkansen Bypass connecting three major metropolitan areas in Japan. The commercial service between Tokyo and Nagoya will start in 2027, and the service between Tokyo and Osaka is planned in 2045 or earlier. While the existing Tokaido Shinkansen connects between Tokyo and Osaka in about two and a half hours, the superconducting maglev train will be able to connect between them in about one hour.