

Research on Improving Detection Rate of Rail Transverse Defect Based on Phased Array Ultrasonic Technology

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The rolling contact fatigue occurs between rail and wheel. Under the action of alternating load, the fatigue source of small cracks gradually expands and then form rail transverse defect, the rail transverse fracture, which is the one of the most dangerous rail fatigue defects, is caused by bending stress. However, the detection of rail transverse defect becomes a challenge due to the different types of rails, small radius curves and serious wear, etc. This paper proposes an idea, which based on fast phased array technology for the wide scan coverage of rail head damage. The multi-angle ultrasonic beam is generated by the phased array probe in the rail transverse direction. Its sound field overlay different rail types, different rail head abrasion, and different alignment state of the probe, which cover the inside, middle and outside of the rail head. Different parameter rail head side drill hole, rail head flat bottom hole, rail notch and other artificial defects are machining in 60kg / m rail and 75kg / m rail respectively. The results show that the fast phased array technology can improve the adaptability of detection under the complicated and changeable conditions of railway, and raise the detection rate of rail head damage at high speed.