土木工程学院在钢轨裂纹扩展研究方面取得新进展 (/part/3561-2020-10-12-08-56-28)

2020年10月12日

近日，我院王建西教授作为通讯作者，我校李杨博士生、陈进杰教授、陈龙博士生作为作者，在国际学术期刊Proceedings of the Institution of Mechanical Engineers，Part C：Journal of mechanical engineering science（DOI: 10.1177/0954406220927069, on-line first） 和 Engineering Failure Analysis （115,104689）上发表系列论文“Study on the residual stress distribution of railway rails”和“Analysis of fatigue crack propagation in rails under combined action of wheel load and residual stress”。上述论文系统分析了钢轨残余应力分布的影响因素及其对钢轨疲劳裂纹扩展特性的影响机理。

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Study on the residual stress distribution of railway rails

Yang Li, Jinjie Chen, Jianxi Wang, Hu Zhao, Long Chen

School of Civil Engineering, Shijiazhuang Tiedao University, Shijiazhuang 064303, China
School of traffic and transportation, Shijiazhuang Tiedao University, Shijiazhuang 064303, China

Keywords: Rail, residual stress, wheel load, friction coefficient, longitudinal creep rate

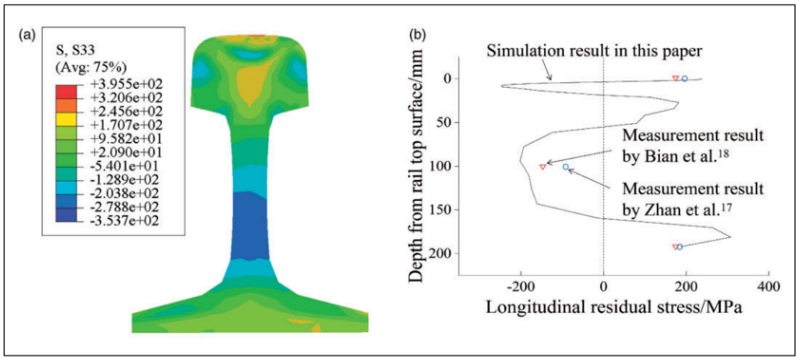

Figure 3. Longitudinal residual stress of the rail after straightening: (a) contour in the cross section and (b) distribution on the symmetrical axis of the cross section (unit: MPa).

钢轨残余应力分布云图　　残余应力沿对称轴分布规律

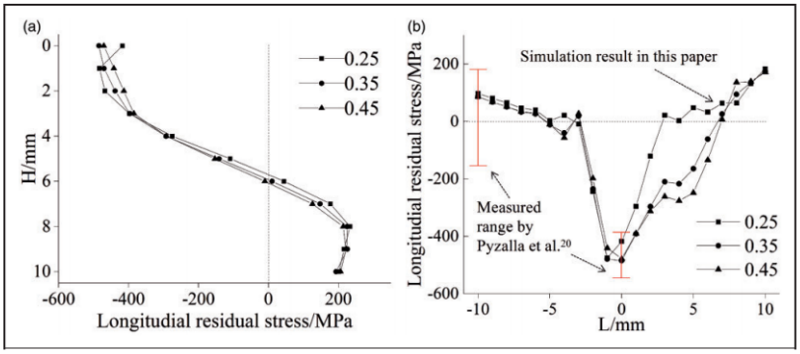

Figure 14. Longitudinal residual stresses under different friction coefficients in (a) path 2 and (b) path 3.
H: the depth below wheel–rail contact center of the rail; *L*: the horizontal distance from point M, which is negative on the side near the working side and positive on the side near the rail top.

摩擦系数对垂向路径残余应力的影响　　摩擦系数对横向路径残余应力的影响

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Analysis of fatigue crack propagation in rails under combined action of wheel load and residual stress

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School of Civil Engineering, Shijiazhuang Tiedao University, Shijiazhuang 064303, China
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Keywords: Rail, residual stress, fatigue crack, crack tip displacement, crack propagation

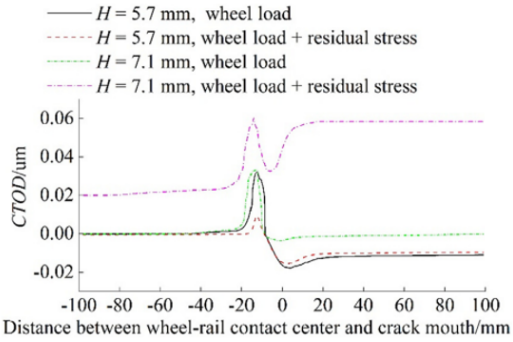
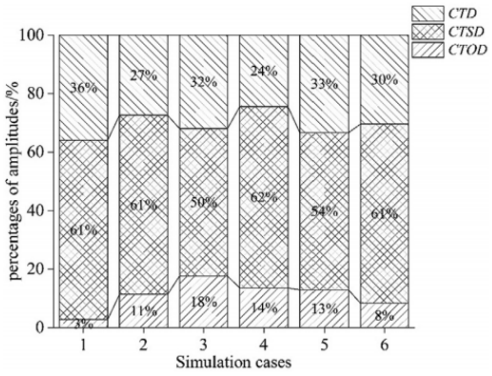


Fig. 5. Change of *CTOD* during wheel rolling process.

残余应力对钢轨疲劳裂纹尖端张开位移的影响

石家庄铁道大学 Shijiazhuang Tiedao University | 土木工程学院 School of Civil Engineering



残余应力对钢轨疲劳裂纹扩展模式的影响

石家庄铁道大学 Shijiazhuang Tiedao University | 土木工程学院 School of Civil Engineering

钢轨是铁路轨道系统最重要的组成部件之一。钢轨直接与机车车辆的车轮相接触，因此，钢轨的表面伤损，如表面滚动接触疲劳裂纹、磨耗等，一直是铁路养护部门与专家学者的关注重点。残余应力对钢轨表面滚动接触疲劳裂纹的扩展特性有着较大的影响，本系列论文系统分析了轮轨力、轮轨摩擦系数等因素对残余应力分布的影响规律，进而研究残余应力分布差异对钢轨表面滚动接触疲劳裂纹扩展特性的影响机理，相关研究结论为从残余应力角度控制钢轨疲劳裂纹扩展提供了可借鉴的思路。

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学院地址:河北省石家庄市北二环东路17号 邮政编码： 050043

邮箱：tmxy@stdu.edu.cn

(http://tmxy.stdu.edu.cn/administrator)