Abstract Submitted
for the MAS16 Meeting of
The American Physical Society

Mechanical Analysis of the Rail under Axial Loading and Thermal Stress RICHARD KYUNG, SEUNG WON PARK, Choice Research Group — High compressive and tensile forces can be created in rails due to thermal expansion of the rail material. Such a compressive force, together with dynamic loads of the train applied to the track, can lead to dangerous track buckling. To minimize this effect, rails should be adjusted to eliminate or minimize compressive forces and longitudinal thermal load at an intermediate temperature. This paper presents how the temperature changing from a neutral temperature results in longitudinal force and how thermal expansion and contraction leads to variations in the strain, which cause longitudinal stress in rails. The longitudinal normal force in the rail resulting from a temperature change is also determined. In addition, longitudinal stress due to thermal expansion and contraction in rails that are restricted in their longitudinal movement or confined at the ends is calculated. To examine the effect of static loads applied on the rail, the railroad model is divided into 15 sections. Then, the pressure of each section is calculated for the rail type A and B. The results show that the pressure exerted on the section increases, remains constant, and then decreases, as the section moves from the top to the bottom.

Richard Kyung
Choice Research Group

Date submitted: 19 Sep 2016 Electronic form version 1.4