

Relationship between passenger vehicle front shape and energy absorption characteristics

Keisuke Fukuyama ¹⁾ Takahiro Isshiki ¹⁾ Koji Mikami ¹⁾

¹⁾ Japan Automobile Research Institute
2530 Karima, Tsukuba, Ibaraki, 305-0822, Japan (E-mail: kfuku@jari.or.jp)

KEY WORDS: Safety, Body Structure, Accident Reconstruction, Energy Absorption Diagram [C1]

In traffic accident analysis, energy absorption diagrams are widely used to estimate collision energy (or impact speed) by calculating deformation energy from the extent of a vehicle's permanent deformation. Conventional charts classified vehicles based on vehicle type and engine displacement. However, the diversification of vehicle types, combined with the trends toward smaller engines and electrification, suggests that these traditional classification criteria may no longer adequately reflect the differences in energy absorption characteristics among individual vehicles. In this study, prior to developing energy absorption diagram applicable to modern vehicles, we investigated whether correction based on the amount of permanent deformation using FOH (Front Overhang) could improve the accuracy of estimating deformation characteristics (Fig1, Fig.2). The results revealed a correlation between FOH and ideal offset values (Fig.3), confirming that FOH-based correction can reduce vehicle-to-vehicle variation in permanent deformation (Fig.4).

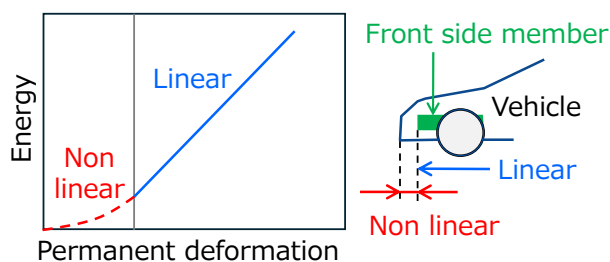


Fig.1 Model of deformation characteristic

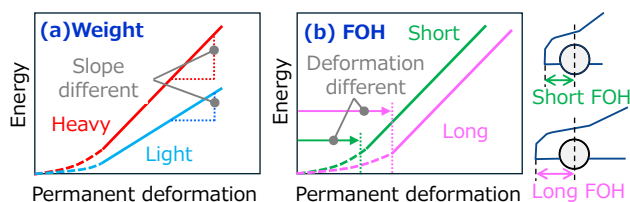


Fig.2 Model of effects of vehicle weight and FOH

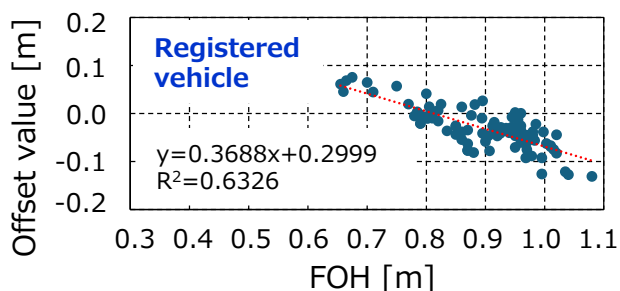


Fig.3 Relationship between FOH and offset value

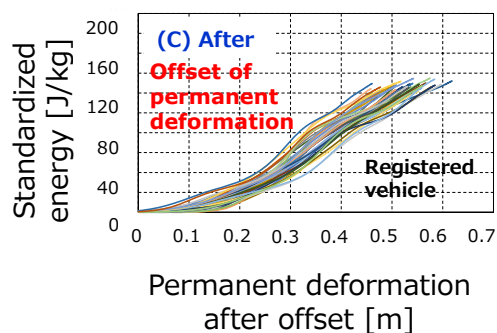
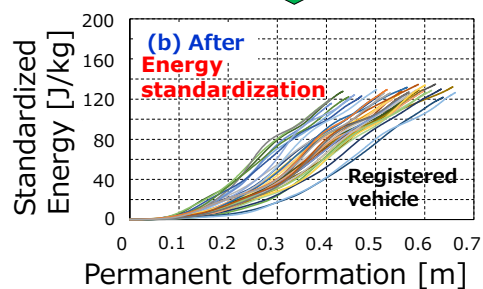
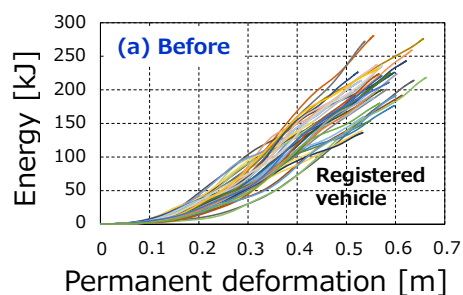


Fig.4 Energy standardization and offset of permanent deformation