DS '11 KOBE
*International Symposium on*
*Disaster Simulation & Structural Safety in the Next Generation (DS'11)*
*September 17-18, 2011, JAPAN*

# Performance Evaluation of RC Protective Barrier under Impact Load Caused by Train Collision

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***Keywords*:** *Train collision, RC protective barrier, Numerical simulation, FEM*

## SUMMARY

On 25 April 2005, a JR-West express train derailed on its journey on Fukuchiyama Line and collided with an apartment building in the vicinity of rail line and this accident caused a great deal of serious damage to human life. This accident concerns a specific factor of Japan that buildings are constructed in the vicinity of rail lines to use a little land efficiently, and a similar situation to the place that the Fukuchiyama Line accident occurred exists in large numbers in Japan. However, enough countermeasures against such railway accidents have not been taken.

A number of studies about safety countermeasures against railway accidents are reported in recent years. As for derailment accidents, a study on the crashworthiness of a RC derailment wall under a collision of railroad vehicle was reported by Y.Sonoda(Prof. of Kyushu Univ.). In a study that was reported by this author about a train collision with a building structure, which assumes the JR Fukuchiyama Line accident, the collision condition is reproduced using a numerical simulation.

In this report, the effectiveness of the RC protective barrier, whose objective is to reduce the damages to both the train and the buildings constructed in the vicinity of rail-line, is evaluated by the numerical simulations using LS-DYNA. More specifically, the situation that a train going around a curve collides with an RC protective barrier is simulated, and the changes of damage condition depending on the friction coefficient between the train and the barrier is evaluated. As for the concrete material model, a continuous surface cap model with a smooth intersection between the shear yield surface and hardening cap is used. The reinforcement model is built separately from the concrete model, and an elasto-plastic material model is used for the reinforcement model. With this numerical simulation, it appeared that the friction coefficient between the train and the barrier has effects on the damaged condition, and it assumed that the surface treatment of an RC protective barrier to make the friction coefficient smaller is one of the efficient ways to reduce the damages of a train.