 *1

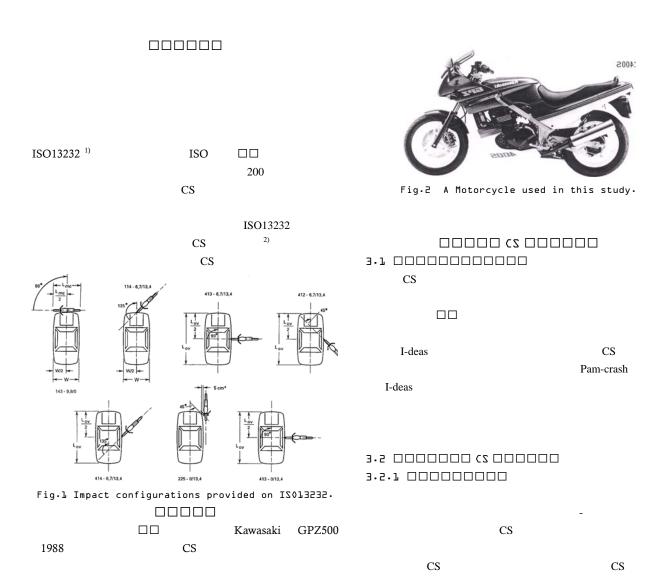
A methodology for Motorcycle-vehicle Crash Simulation -Development of Motorcycle Computer Simulation Model-

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*3

Tamotsu NAKATANI and Minoru SAKURAI Anoop CHAWLA and Sudipto MUKHERJEE

The diversity of impact configurations observed in motorcycle-vehicle collisions and the complexity of the motorcycle rider's behavior in collisions make it extremely difficult to evaluate the protection of the rider. It is necessary to apply computer simulation techniques to provide an efficient and analytical approach to the research of rider protection. This paper describes the development of a motorcycle model for the analysis of a wall crash using Pam-crash. The calculated results demonstrate a good agreement with the experimental data regarding the force-time curve and the kinematics of the motorcycle.



	218kg	3.54m				23	
	10mm/r	nin.		R 200			
					Fig.5	Compression test	of a seat.
		50kg	0.2m			** \	10.
		ISO13232		CS			6
3.2.2	000000	CZ				Voweshing 1	
		CS			X S		
		CS		-	Fig.	∟ Drop test of	a tank.
100mm		12	20mm				
	120mm	100					
		100mm				CS	
		CS			I-deas		CS
		CS			-		50mm
			CS				
Fig.3 Measurement points.							
	0		0		Fig.7	Drop test of a f	ront wheel.

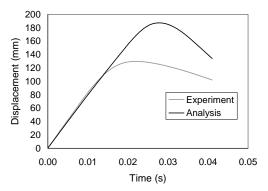


Fig.8 Displacement-time curves of experimental and $$\sf CS$$ results ${\sf in drop \ test \ of \ a \ front \ wheel}.$

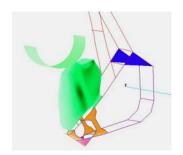


Fig.9 Drop test to a tank.

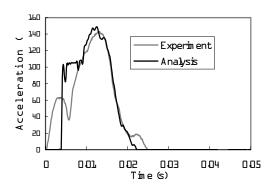


Fig.10 Acceleration-time curves of experiment and CS results

in drop test to a tank.



Fig.11 Static compression test of a seat.

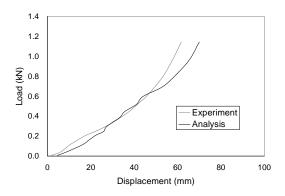


Fig.12 Load-displacement curves of experiment and CS in static compression test of a seat.

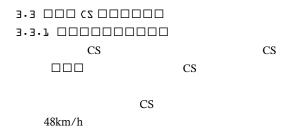




Fig.13 Crash test of a motorcycle to a wall.

3.3.2 □□□ CS

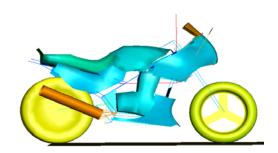


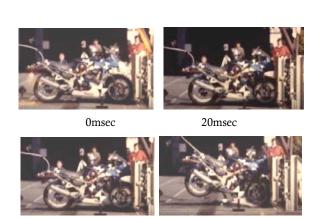
Fig.14 Motorcycle computer simulation model.

□□□ 20msec
40msec

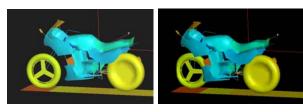
60msec 100msec

CS
□□□ -

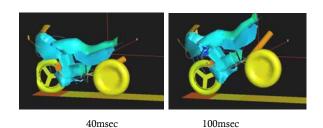
CS



 $$40 \rm{msec}$$ $$100 \rm{msec}$$ Fig.15 Behaviors of motorcycles in experimental results of wall crash tests.



0msec 20msec



 $\label{fig-lb-Behaviors} \mbox{ Fig-lb-Behaviors of motorcycles} \\ \mbox{in computer simulation results of wall crash tests.} \\$

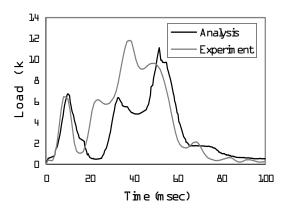


Fig.17 Force-time curves measured on a wall.

CS ISO13232

1)ISO13232 Motorcycles- Test and Analysis Procedures for Research Evaluation of Rider Crash Protective Devices Fitted to Motorcycle, Dec.1996.

2) A.Chawla A methodology for Car-Motorcycle Crash Simulation, , Vo.23, No.2, 2001