Jonas Aditya PRAMUDITA, Dr. Eng.

Assistant Professor

Program: Advanced Materials Science and Technology

Area: Advanced Mechanical Science and Engineering

Undergraduate: Dept. of Mechanical and Production Engineering

http://biomech3d.eng.niigata-u.ac.jp/

Professional Expertise

His professional expertise covers strength of material, biomechanics and computational dynamics, especially biomechanics of injury due to external loading during various accidents. He has knowledge and experience in conducting experiments on human subject, biological tissue and its substitute material, as well as numerical simulation using finite element method and multi-body dynamics. Prediction, prevention and mitigation of injury are the aims of his researches.

Research Fields of Interest

1. Development of human model

Human multi-body models were developed based on the characteristics of Japanese male and female. The model was able to simulate the response of vehicle occupant during rear impact. The effect of gender difference on the occupant responses was then investigated by these models. A head-neck finite element model and a finger finite element model were also constructed from CT images in order to determine the internal response of human body under impact loading.

2. Spine alignment and whiplash injury analysis

Variation in spine alignment was investigated by analyzing lateral x-ray image of patients or volunteers. Variation in the spine curvatures could be quantified and classified into several groups. Head-neck finite element models with different spine curvatures were then used in a whiplash simulation in order to determine the influence of spine curvatures on the neck injury risk.

3. Mechanical characterization of skin and laceration injury reconstruction.

A novel biaxial tension fixture was developed for testing hyper-elastic materials such as porcine skin. The tensile test result of porcine skin was then utilized in the determination of Ogden model parameters. A device for reconstructing skin laceration accident was also developed in order to investigate the tolerance of porcine skin against blade edge. As a result, a skin laceration criterion was proposed based on the mechanical response of skin specimen.

Education

2010: Dr. Eng. in Mechanical and Environmental Informatics, Graduate School of Information Science and Engineering, Tokyo Institute of Technology, Japan

2007: M. Eng. in Mechanical and Environmental Informatics, Graduate School of Information Science and Engineering, Tokyo Institute of Technology, Japan

2006: B. Eng. in Mechanical Engineering and Science, School of Engineering, Tokyo Institute of Technology, Japan

Professional Societies and Activities

1. Japan Society of Mechanical Engineers (JSME), Member
2. Society of Automotive Engineers of Japan (JSAE), Member
3. Japan Society of Experimental Mechanics (JSEM), Member
4. Japan Society for Computational Engineering and Science (JSCES), Member

Awards

1. JSAE Engineer, 2010
2. JSAE Graduate Research Encouragement Award, 2010

Major Publications

Papers

[1] "Deformation Behavior of Skin Simulant during Penetration of Blunt Object", Journal of the Japanese Society for Experimental Mechanics, vol.15, no.special issue, 2015 (Accepted)

[2] "Tensile Properties of Porcine Skin in Dorsal and Ventral Regions", *Journal of the Japanese Society for Experimental Mechanics*, vol.14, no.special issue, pp.s245-s250, 2014

[3] "Numerical Analysis of Vehicle Occupant Responses During Rear Impact Using a Human Body Model", *Applied Mechanics and Materials*, vol.566, pp.480-485, 2014

[4] "Development of An Occupant Multi-Body Model Based on Japanese Male Characteristics Data for Rear Impact Analysis", *International Journal of Crashworthiness*, vol.19, no.2, pp.182-195, 2014

[5] "Strength of Porcine Cervical Facet Joint Capsular Ligament under Vertebral Axial Tensile Loading", *Journal of Biomechanical Science and Engineering*, vol.8, no.4, pp.293-305, 2013

[6] "Development and application of stress-based skull fracture criteria using a head finite element model", *Journal of Biomechanical Science and Engineering*, Vol.7, No.4, pp.449-462, 2012

[7] "Injury prediction of automobile occupants in side impact using multibody simulation", *Transactions of the Society of Automotive Engineers of Japan*, Vol.42, No.2, pp.349-354, 2011 (In Japanese)

[8] "Development of occupant injury prediction method based on frontal collision accident simulation using multi-body model", *Transactions of the Society of Automotive Engineers of Japan*, Vol.42, No.1, pp.73-78, 2011 (In Japanese)

[9] "Evaluation parameters and criteria for the reduction of minor neck injuries during rear-end impacts: Human volunteer experiments and accident reconstruction using human FE model simulations", *Transactions of the Society of Automotive Engineers of Japan*, Vol.41, No.2, pp.233-240, 2010 (In Japanese)

[10] "Brain responses to rotational and translational impact, and influence of individual differences in head shape", *Transactions of The Japan Society of Mechanical Engineers, Series A*, Vol.76, No.761, pp. 44-51, 2010 (In Japanese)

[11] "Development of a head-neck finite element model and analysis of intervertebral strain response during rear impact", *Transactions of the Japan Society of Mechanical Engineers, Series A*, Vol.75, No.759, pp.1549-1555, 2009 (In Japanese)

Proceedings

[1] "Effect of Cervical Spine Alignment on Neck Injury Risk during Rear-end Impact: Numerical Study using Neck Finite Element Model", *Proceedings of the International Crashworthiness (ICRASH) Conference 2014*, No. ICR-14-05, 2014

[2] "Development of occupant injury prediction algorithms for advanced automatic collision notification by numerical crash reconstructions", *Proceedings of 23rd International Technical Conference on the Enhanced Safety of Vehicles (ESV)*, Paper No. 13-0149-W, 2013

[3] "Analysis of intervertebral strain response during rear impact using head-neck finite element model", *Proceedings of 6th World Congress on Biomechanics (IFMBE Proceedings 31)*, No. SPKA00115-00184, pp. 354-357, 2010

[4] "Biomechanical research for the reduction of minor neck injuries during rear-end impacts － Human volunteer experiments and accidents reconstruction using human FE model simulations", *Proceedings of FISITA 2010 World Automotive Congress*, No. F2010D091, 2010

[5] "Evaluation criteria for the reduction of minor neck injuries during rear-end impacts based on human volunteer experiments and accident reconstruction using human FE model simulations", *Proceedings of 2009 International IRCOBI Conference on The Biomechanics of Impact*, pp. 381-398, 2009

[6] "Three dimensional analysis for cervical vertebral responses of automobile passengers due to lateral impact", *Proceedings of the International Crashworthiness (ICRASH) Conference 2008*, No.2008-053, 2008

Book Chapters

[1] "Human model and Sport engineering", *Simulation Dictionary (eds. Japan Society for Simulation Technology)*, Corona Publishing, p.157 and p.168, 2012 (In Japanese).

[2] "Head/neck/torso behavior and cervical vertebral motion of human volunteers during low speed rear impact: Mini-sled tests with mass production car seat", *Neck Injury Biomechanics (eds. Pike, J.A)*, SAE International, pp. 373-390, 2009