

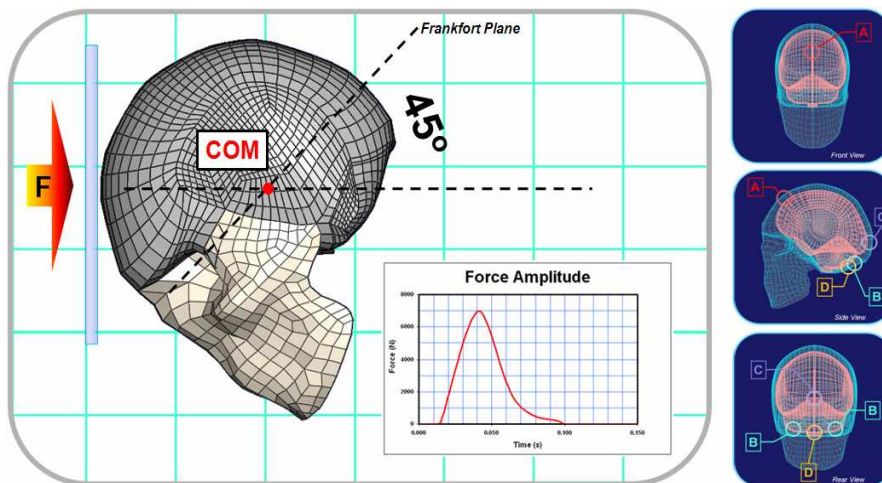
Numerical investigation of head injury caused by blasts

--- Prepared by Dr Wenyi Yan, Department of Mechanical & Aerospace Engineering,
Monash University

Exposure to blast is becoming more frequent due to the use of improved explosive devices (IEDs) in terrorist and insurgent activities. A recent study found that 88% of military personnel treated at an echelon II medical unit in Iraq had been injured by IEDs or mortar.¹

Shear and stress waves from the primary blast could potentially cause traumatic brain injury directly, which includes concussion, haemorrhage, edema and diffuse axonal injury.² Substantial studies on secondary and tertiary blast-related head injury have been done. In contrast, the primary blast caused TBI is a relatively new field.³ The aim of the proposal is to numerically simulate the response of a head due to blast and to examine the brain injury by using existing theories such as Head Injury Criteria. Results from this project will not only help us to understand the mechanism of TBI caused by the primary blast but also provide the basis for evaluating the protection of a ballistic helmet on TBI caused by primary blast injury in the future.

1. Murray CK, Reynolds JC, Schroeder JM et al. Spectrum of care provided at an Echelon II medical unit during Operation Iraqi Freedom. *Mil Med* 2005; 170:516–520.
2. Taber K, Warden D, Hurley R. Blast-Related Traumatic Brain Injury: What is Known? *J Neuropsychiatry Clin Neurosci* 2006; 18:141-145.
3. Ziejewski M, Karami G, Akhatov I. Selected biomechanical issues of brain injury caused by blasts. Available on <http://www.blastinjuryinstitute.org/biomechanics/>. Accessed on 28th November 2008.



An example of an FE simulation of a head impact