*Movement, Health & Exercise, 1(1), 1-9, 2012*

# FINITE ELEMENT SIMULATION OF *TAKRAW* BALLS AND THEIR IMPACT ON A FLAT SURFACE

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**Abstract**

The *takraw* ball is a very unique interwoven ball used in the action game of *sepak takraw*. The traditional *takraw* ball is manufactured by conventionally weaving split rattan strips into a spherical basket. Modern *takraw* balls are manufactured by forming strips of plastics materials into interwoven hoop. These interwoven hoops form 12 pentagon holes and 30 intersections. The purpose of this study is to construct a finite-element (FE) model of a *takraw* ball in particular for normal impact simulation on flat surfaces under low speed conditions. Two FE models were developed to observe the dynamic behavior including impact forces, contact time, coefficient of restitution and deformation of the ball. The first model consists of a single solid hollow ball with 12 pentagon holes and the second model consists of six center strips and 12 side edge strips of extrusion hoops to form 12 pentagon holes and 270 cross-sections. The models were also compared with results of experimental impact tests whereby the ball was impacted normal to a rigid plate at three different heights. The ball is described in the FE model as a linear elastic material. It was found that the FE analysis solution of the ball model was found to be reasonably close with the experimental results. However further improvement need to be done by taking into consideration the nonlinearity of the *takraw* ball under large deformation as well as at high impact velocity.

*Keywords: Takraw ball, finite element model, normal impact force, ball deformation.*