Experimental investigation of a human-like rib cage model subjected to an impact load

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Abstract: This work continues some experimental investigations of a human-like rib cage subjected to an impact load. The construction of the experimental rig is based on a Hybrid III thorax calibration test stand. The measured impact velocity reaches 4 m/s and the impact mass 23 kg. The elastic impact subsystem consists of a rigid disc, the initial velocity of which is initiated by a pre-tensioned spring of high stiffness. Time characteristics of force and deflection responses of the investigated model constitute reference properties in identification of the human-like rib cage. Another aim of this work is to obtain biologically compatible parameters, like stiffness and damping of the artificial chest, by fitting a proper material that will to an average degree imitate properties of internal organs of the human chest. All measurements presented in the work were collected with the use of the NI cRIO embedded system. Chest deflection was captured by measuring the angle between the sides of shoulders of an isosceles triangle. The triangle was mounted between the sternum and the vertebral column, and the angle was captured with a potentiometer. In addition, an accelerometer was used to record the acceleration of the impacting mass.

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