A HYBRID MODEL OF THE RESPIRATORY SYSTEM

Marcin Michnikowski, Jarosław Glapiński, Maciej Guć, Tomasz Gólczewski, Marek Darowski

Institute of Biocybernetics and Biomedical Engineering, Polish Academy of Sciences, Warsaw, Poland

Abstract:

The aim of this work is building a hybrid model of the human respiratory system which enables connecting the real clinical devices (respirators) with the. computerized virtual lungs. A simulation of the artificial ventilation of lungs, with the use of the hybrid model and the Siemens Servo 900 respirator, was made. Waveforms of pressure inside the lungs, flow in the respiratory tract, and the lung volume during the simulated artificial ventilation were recorded. The compliance and resistance of the hybrid model of the respiratory system were calculated on the basis of the inspiratory pause algorithms and compared to the values set in the model.

The initial tests have shown that the calculated values of the parameters differ by 20% (worst result) from the values set in the model. The model will enable the investigation of the different modes of lung ventilation, as well as educational presentation of the respirator-patient interaction.

Keywords: model of lungs, respiratory system