CHT-17: COMPUTATIONAL AND EXPERIMENTAL ANALYSIS OF NEWBORN BRAIN COOLING PROCESS

Andrzej J. Nowak[*,§], Marek Rojczyk[*], Jakub Klim[*], Joanna Łaszczyk[**] and Wojciech Walas[***]
[*]Institute of Thermal Technology, Silesian University of Technology, Gliwice, Poland
[**]C&C Technology, Sosnowiec, Poland
[***] Medical Centre in Opole, Department for Children Intensive Therapy, Opole, Poland
[§]Correspondence author. Fax: +48 32 2371025   Email: andrzej.j.nowak@polsl.pl

ABSTRACT This paper presents the computational model of neonate's whole body model which is used to simulate selective brain cooling process. Model is based on Pennes bioheat equation and its parameters have been found carrying out an inverse analysis (based on minimisation of the standard least-square objective function) and utilising some thermal measurements collected during real therapy. Model is then verified and tuned by monitoring of the volume flow rate and temperatures of a cooling fluid flowing through a cooling cap. This allows to determine time history of the heat flux transferred during brain cooling process from the patient head to the cooling fluid which helps to understand process better and fully control it. At the same time developed computational model simulates the hypothermic therapy reasonably well and allows to predict parameters of that process fairly accurate.