Robot manipulacyjny do rehabilitacji kolana dla pacjentów z aparatem Ilizarowa zamocowanym na udzie.

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Abstract

We present a prototype construction of manipulative robotic system with 1 degree of freedom designed for increasing of the knee rehabilitation efficiency in case of patients with the femur distraction osteogenesis with use of Ilizarov apparatus. Based on conducted analysis of knee anatomy, biomechanical functionality of knee-joint and characteristic of considered medical treatment, overall assumptions concerning robotic assistance in knee rehabilitation process are formulated. Then we propose a simplified kinematic structure based on one rotational fixed axis taking into account guidelines resulting from specificity of complications following a femur distraction osteogenesis with use of Ilizarov apparatus. The paper presents description of mechanical and measurement system for a considered manipulative robot. The issues regarding patient’s safety while realization of robotic rehabilitation are also discussed. Additionally, motion control and force control design issues are considered and some preliminary experimental results are presented.