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A biomechanical model for the idiopathic scoliosis using robotic traction devices

João Fialho
(Senior Lecturer, joao.f@buv.edu.vn)
British University of Vietnam, Hanoi, Vietnam
Centro de Investigacao em Matemática e Aplicações (CIMA-UE),
Universidade de Évora, Evora, Portugal

Abstract

The mathematical modeling of idiopathic scoliosis has been studied throughout the years. The models presented on those papers are based on the orthotic stabilization of the idiopathic scoliosis, which are based on a transverse force being applied to the human spine on a continuous form. When considering robotic traction devices, the existent models cannot be used, as the type of forces applied are no longer transverse nor applied in a continuous manner. In robotic devices, vertical traction is applied and in addition,

parameters such as magnitude, direction and angle of the force applied are required and essential, if the best therapy plan is to be administered. In this study, we propose a mathematical model to the idiopathic scoliosis, using robotic traction devices, and with the parameters obtained from the mathematical modeling, set up a case-by-case individualized therapy plan, for each patient. To the best of our knowledge, modeling involving these assumptions was never investigated before, neither was the usage of modeling to establish viable and effective bounds for all the possible parameters in a robotic traction device.

Keywords: Mathematical modeling, lumbar traction devices, scoliotic spine, ODE's.

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