Abstract

This paper will analyze the application of mathematical models onto biomechanical systems, specifically running gait mechanics and the foot/ground interaction, as well as its application to long distance running footwear and sports performance. A literature review was conducted by collecting research articles through Science Direct, Web of Science and Pub Med. The purpose of this research was to highlight the process of mathematical modeling and how it can be applied to human dynamics to improve performance. Multiple models are analyzed that incorporate different aspects of gait mechanics, including simulating dampening of shoes and the spring like effect of the arch of the foot and the metatarsophalangeal joint. Many breakthroughs have already been made in this field, but what this paper brings is the connection between the theory and the application and how these models can show which factors influence performance the most. What is concluded is that these highlighted factors do lead to improved sports performance specifically when looking at the Nike Vaporfly 4% running shoe and both men's and women's world record marathon time.