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### **The mechanics and ergonomics of golf putting: A novel approach to reduce the golf putt handicap**

**K S Chang**

Korea Advanced Institute of Science and Technology, South Korea

Golf putting is an ultimate golf swing that can lead a golfer to the championship of a professional tour game. In other words, golf putting is the major swing by which one can afford to lower significantly the golf handicap. However, golf putting is a complicated man-machine interaction that seems not properly understood so far: Evidence is that even a 3~4 foot putt is not always safely done by many golfers. Lack of theory, golf putting is believed to be the art of a few outstanding individual golfers. The author has endeavored to elicit the secret of golf putting, based on the knowledge and research experience of more than 30 years in the particular areas such as fluids, air, heat, waves and solids at KAIST. In this paper, we consider what we can do to improve the putter design within the rules of USGA and R&A. As a result, a few putter head designs as well as a new shaft structure that can help the golfer to feel the putter weight better during the swing have been invented: It facilitates the double pendulum motions by the two arms and the club. In brief, golf putting is a system consisting of a man and a machine that interact during the swing. The man-machine system becomes whole when any mismatch in the mechanics and ergonomics of the double pendulum motion is corrected. The mechanics and ergonomics of the putting, putter design and the pitfalls of the inclined putting will be addressed.

#### **Biography**

K S Chang had graduated from UC Berkeley with PhD and done postdoctoral research at NASA Ames Research Center before he joined Department of Aerospace Engineering, KAIST, South Korea for teaching and research. He has made contributions in computational fluid mechanics, shock wave experiments and simulations, cardiovascular blood flow and respiration model studies with more than 200 refereed papers. He is now Professor Emeritus at KAIST and has started a small venture company called T2P in Golf.

[ventura@kaist.ac.kr](mailto:ventura@kaist.ac.kr)