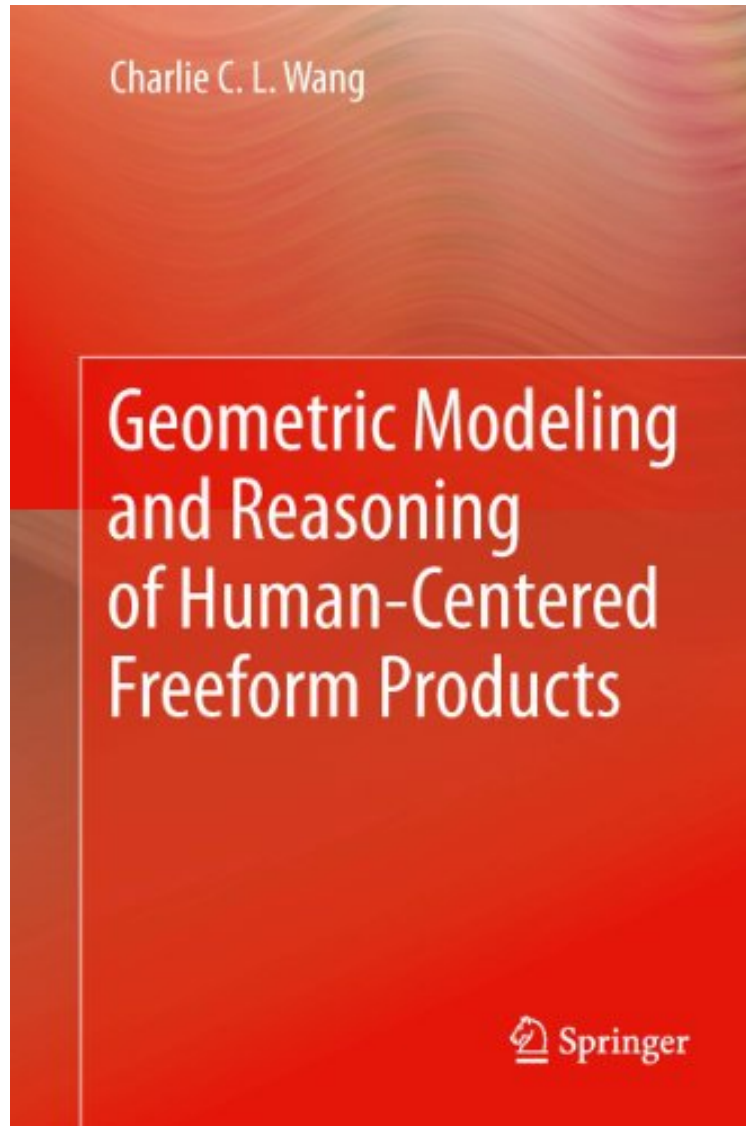


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Geometric Modeling and Reasoning of Human-Centered Freeform Products

Charlie C. L. Wang

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The recent trend in user-customized product design requires the shape of products to be automatically adjusted

according to the human body's shape, so that people will feel more comfortable when wearing these products. Geometric approaches can be used to design the freeform shape of products worn by people, which can greatly improve the efficiency of design processes in various industries involving customized products (e.g., garment design, toy design, jewel design, shoe design, and design of medical devices, etc.). These products are usually composed of very complex geometric shapes (represented by free-form surfaces), and are not driven by a parameter table but a digital human model with free-form shapes or part of human bodies (e.g., wrist, foot, and head models). Geometric Modeling and Reasoning of Human-Centered Freeform Products introduces the algorithms of human body reconstruction, freeform product modeling, constraining and reconstructing freeform products, and shape optimization for improving the manufacturability of freeform products. Based on these techniques, the design automation problem for human-centered freeform products can be fundamentally solved. Researchers and developers working on problems of automatic designing individually customized products can use this book as a reference, and it can also be used in courses in computer-aided product design at the graduate level.

From the Back Cover The recent trend in user-customized product design requires the shape of products to be automatically adjusted according to the human body's shape, so that people will feel more comfortable when wearing these products. Geometric approaches can be used to design the freeform shape of products worn by people, which can greatly improve the efficiency of design processes in various industries involving customized products (e.g., garment design, toy design, jewel design, shoe design, and design of medical devices, etc.). These products are usually composed of very complex geometric shapes (represented by free-form surfaces), and are not driven by a parameter table but a digital human model with free-form shapes or part of human bodies (e.g., wrist, foot, and head models). Geometric Modeling and Reasoning of Human-Centered Freeform Products introduces the algorithms of human body reconstruction, freeform product modeling, constraining and reconstructing freeform products, and shape optimization for improving the manufacturability of freeform products. Based on these techniques, the design automation problem for human-centered freeform products can be fundamentally solved. Researchers and developers working on problems of automatic designing individually customized products can use this book as a reference, and it can also be used in courses in computer-aided product design at the graduate level.

About the Author Dr. Charlie C. L. Wang is currently an Associate Professor at the Department of Mechanical and Automation Engineering, The Chinese University of Hong Kong, where he began his academic career in 2003. He gained his B.Eng. (1998) in Mechatronics Engineering from Huazhong University of Science and Technology, M.Phil. (2000) and Ph.D. (2002) in Mechanical Engineering from the Hong Kong University of Science and Technology. He is a member of ASME and IEEE, and Chairman of Technical Committee on Computer-Aided Product and Process Development (CAPPD) of ASME. He is currently on the editorial board of Computer-Aided Design journal and International Journal of Precision Engineering and Manufacturing, and is an Associate Editor of Journal of the Chinese Institute of Industrial Engineers and International Journal of Virtual Reality. Dr. Wang has received a few awards including the ASME CIE Young Engineer Award (2009), the CUHK Young Researcher Award (2009), the CUHK Vice-Chancellor's Exemplary Teaching Award (2008), the Best Paper Awards of ASME CIE Conferences (in 2008 and 2001), and the Prakash Krishnaswami CAPPD Best Paper Award of ASME CIE Conference in 2011. His current research interests include geometric modeling in computer-aided design and manufacturing, biomedical engineering and computer graphics, as well as computational physics in virtual reality.