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Abstract
Since this is an aging society, the demand on wheelchairs grows steadily. Nevertheless, the performance and operation of present wheelchairs still have to be improved. The application of transmission hub onto the motion mechanism can greatly improve the performance of wheelchair so that it can rotate at the same point and meet the requirement of single power input. However, there are no relevant researches on the application of transmission hubs with planetary gear onto wheelchairs. To solve this problem, this work aims to develop effective design methods and theories based on present transmission hubs of bicycle so that a new type of transmission hub can be developed for wheelchairs. At first, starting with studying and analyzing documents on bicycle we investigated the applicability of transmission hubs onto wheelchairs and the requirement of wheelchairs for transmission hubs. Then, based on the design requirement of a five shift-levels (i.e. high-speed, direct, low-speed, neutral and reverse gear shifts) transmission hub with 6-link and 7-link planetary gear structural synthesis, shift-level synthesis, kinematics synthesis were developed according to the design method and process as well as performance requirement of transmission hubs for wheelchair. Finally, we chose the most practicable design to develop a shift-level control governor to confirm that the transmission hub is workable and worth for developing.
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