During a wheelchair basketball game, the interaction between wheelchair and athlete has an impact on the performance of the athlete. Optimal interaction is therefore extremely important because it may be decisive for winning or losing the game. But what is optimal interaction and how to achieve it? A basketball sports wheelchair can be adjusted in many ways and all adjustments have a potential effect on the interaction and therefore on the performance. In the search for the optimal adjustment of the wheelchair to the athlete, detailed information about all wheelchair movements and athlete actions during a wheelchair basketball game is required. These wheelchair movements and athlete actions are called mobility performance. The research in this thesis describes the way to model mobility performance by means of defining, quantifying, simulating, predicting and optimizing mobility performance.