14. A method for simulating a combined musculoskeletal and augmentation device system including segments and joints connecting the segments, the method comprising the steps of:

computing assist torques of the augmentation device, based on simulated kinematic data;

computing net joint torque and muscle torque based on the simulated kinematic data, desired kinematic data of the segments and the assist torques;

checking and adjusting the computed muscle torques; and

computing the simulated kinematic data of the segments based on the computed torques at the joints.

15. A method according to claim 14, the step of checking and adjusting the computed torques comprises deducing muscle forces from the computed muscle torques, comparing the muscle forces with maximum force limits and adjusting a muscle force if the muscle force exceeds a limit, to adjust the corresponding computed torque.

16. A method according to claim 15, wherein the step of checking and adjusting the computed torques comprises comparing muscle forces with and without the assist torques in order to asses whether the assist torque control helps or hinders motion and adjusting the muscle forces and computing feasible joint torques if the assist torque control hinders motion.

17. A method according to claim 15, wherein the step of checking and adjusting the computed torques comprises comparing muscle forces with and without the assist torques in order to asses whether the assist torque control helps or hinders motion and designing the proper assist control law to ensure that the assist torque help the efficiency of motion.

18. A method according to claim 15 or **16**, wherein muscle forces are deduced, based on a static optimization criterion in which a sum of muscle activation squared is minimized.

19. A method according to any one of claims 14 to 18, wherein the step of computing the computed torques comprises computing modified accelerations of kinematic data through non-linear feedback of the modified accelerations kinematic data.

20. A method according to claim 19, wherein the kinematic data include position data, velocity data and acceleration data and computing modified accelerations of kinematic data are computed through non-linear feedback based on desired acceleration data, error between simulated position data and desired position data and error between simulated velocity data and desired velocity data.

21. A method according to claim 19, wherein the kinematic data include position data, velocity data and acceleration data and computing modified accelerations of kinematic data are computed through non-linear feedback based on error between simulated position data and desired position data and error between simulated velocity data and desired velocity data.

22. A method according to any one of claims 14 to 21, wherein the step of computing simulated kinematic data of the segments comprises computing the reaction forces under the segments contacting the ground, based on the computed torques and the simulated kinematic data.

23. A method according to any one of claims 14 to 22, wherein the step of computing assist torques of the augmentation device is performed employing gravity compensation control algorithm in which the augmentation device controller obtains the assist torques to compensate for the forces due to gravity.

24. A method according to claim 23, wherein change in the computed muscle torques, due to change in the gravity assist torque, are computed using coordinates of the center of the mass of the segments.

25. A method according to claim 24, wherein the coordinates of the center of the mass of the segments, are obtained from measurements of joint angles and segment lengths.

26. A method according to claim 23, wherein change in the computed muscle torques, due to change in the gravity assist torque, are computed using measured reaction forces under the feet.

27. A computer readable medium containing a program for simulating a combined musculoskeletal and augmentation device system including segments and joints connecting the segments, the program comprising instructions of:

computing assist torques of the augmentation device, based on simulated kinematic data;

computing torques based on the simulated kinematic data, desired kinematic data of the segments and the assist torques;

checking and adjusting the computed torques; and

computing the simulated kinematic data of the segments based on computed torques at the joints.

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