CLAIMS

1. A vehicle control device comprising:

an allowable velocity pattern calculation part configured to calculate a powering pattern representing velocity of a vehicle at each position of a powering interval in a braking delay period between a timing at which the vehicle exceeds allowable velocity and a braking timing at which the vehicle starts to brake, and a coasting pattern representing velocity of the vehicle at each position of a coasting interval subsequent to the powering interval in the braking delay period based on a braking pattern after calculating the braking pattern representing velocity of the vehicle in a braking interval, which is a running interval subsequent to the coasting interval and which occurs between a position of the vehicle at the braking timing and a target position for controlling the vehicle to run at predetermined velocity or less,

wherein the allowable velocity pattern calculation part uses an acceleration characteristic of a motor depending on velocity of the vehicle when calculating at least the powering pattern, which is the acceleration characteristic of the motor maintained or reduced by a torque as a rotational speed of the motor becomes a higher rotational speed.

2. The vehicle control device according to claim 1, wherein the allowable velocity calculation part uses the acceleration characteristic depending on the velocity of the vehicle when calculating at least one of the coasting pattern and the braking pattern.

3. The vehicle control device according to claim 1 or 2, wherein, when a start point of the powering pattern precedes to a current position of the vehicle, the allowable velocity pattern calculation part carries out iterative calculations to calculate a switching position

between the coasting pattern and the braking pattern and velocity of the vehicle at the switching position as well as a switching position between the powering pattern and the coasting pattern and velocity of the vehicle at the switching position based on a prescribed coasting period of the coasting interval and prescribed acceleration of the vehicle in the prescribed coasting period as well as a prescribed powering period of the powering interval and prescribed acceleration of the vehicle depending on its velocity in the prescribed powering period.

4. The vehicle control device according to claim 1 or 2, wherein the allowable velocity pattern calculation part calculates the powering interval and the coasting interval based on assumed velocity of the vehicle at the current position upon assuming that the braking pattern continues from the current position of the vehicle before the braking pattern, and wherein the allowable velocity pattern calculation part calculates the switching position between the coasting pattern and the braking pattern and the velocity of the vehicle at the switching position as well as the switching position between the powering pattern and the coasting pattern and the velocity of the vehicle at the switching position, and the velocity at the current position based on the powering interval and the coasting interval.

5. The vehicle control device according to claim 3 or 4, wherein the allowable velocity pattern calculation part calculates the allowable velocity based on an altitude at the current position and an altitude at the target position.

6. The vehicle control device according to any one of claims 1 to 5, wherein the allowable velocity pattern calculation part uses the acceleration characteristic depending on a weight of the vehicle.

7. A vehicle control method comprising:

calculating by an allowable velocity pattern calculation part of a vehicle control device a powering pattern representing velocity of a vehicle at each position of a powering interval in a braking delay period between a timing at which the vehicle exceeds allowable velocity and a braking timing at which the vehicle starts to brake, and a coasting pattern representing velocity of the vehicle at each position of a coasting interval subsequent to the powering interval in the braking delay period based on a braking pattern after calculating the braking pattern representing velocity of the vehicle in a braking interval, which is a running interval subsequent to the coasting interval and which occurs between a position of the vehicle at the braking timing and a target position for controlling the vehicle to run at predetermined velocity or less,

wherein the allowable velocity pattern calculation part uses an acceleration characteristic of a motor depending on velocity of the vehicle when calculating at least the powering pattern, which is the acceleration characteristic of the motor maintained or reduced by a torque as a rotational speed of the motor becomes a higher rotational speed.

8. A program causing a computer of a vehicle control device to function as an allowable velocity pattern calculation means configured to calculate a powering pattern representing velocity of a vehicle at each position of a powering interval in a braking delay period between a timing at which the vehicle exceeds allowable velocity and a braking timing at which the vehicle starts to brake, and a coasting pattern representing velocity of the vehicle at each position of a coasting interval subsequent to the powering interval in the braking delay period based on a braking pattern after calculating the braking pattern representing velocity of the vehicle in a braking interval, which is a running interval subsequent to the coasting interval

and which occurs between a position of the vehicle at the braking timing and a target position for controlling the vehicle to run at predetermined velocity or less, wherein an acceleration characteristic of a motor depending on velocity of the vehicle, which is the acceleration characteristic of the motor maintained or reduced by a torque as a rotational speed of the motor becomes a higher rotational speed, is used to calculate at least the powering pattern.