the comfort of the transported load, in particular when the compartment is subjected to unforeseeable events because they depend on exogenous (wind, temperatures, etc.) and endogenous (influence of passengers, other vehicles, etc.) phenomena.

~~Object of the invention~~Summary

The object of the present ~~invention~~ disclosure is to propose a solution which responds to all or part of the aforementioned problems.

~~This object may be achieved through the implementation of~~In a first aspect, the present disclosure provides a method for controlling a vehicle moving on a track, the vehicle comprising rollers intended for contact on at least one support defining the track, a floor intended for transporting a load, said floor cooperating with the rollers through a set of suspensions, the set of suspensions comprising at least one suspension, the at least one suspension being controlled by at least one force setpoint defining the force exerted by the at least one suspension on the floor, the method being implemented by a control command system and comprising the following steps:

- collection of a pitch parameter of the floor, representative of the pitch rotational acceleration of the floor;
- determination of a longitudinal correction command intended to modify the at least one force setpoint;
- application of the longitudinal correction command to the set of suspensions, the longitudinal correction command being representative of a longitudinal force setpoint ~~longitudinal~~ differential, said longitudinal differential being applied between two suspensions associated respectively with two rollers disposed longitudinally in the displacement direction of the vehicle, the differential being dependent on the distance between the two rollers and on the pitch parameter of the floor.

The arrangements previously described make it possible to control the inclination of the vehicle to maintain the load present in a so-called comfortable situation vis-à-vis the acceleration or deceleration of the vehicle. For example, the comfortable situation may correspond to a situation where the acceleration felt by the load is substantially perpendicular to the floor.

By substantially perpendicular, is meant a direction included in an angular interval less than 5° with respect to the direction of the gravitational acceleration and more particularly in an angular interval less than 2.86° with respect to the direction of the gravitational acceleration.

Synergistically, the arrangements described above make it possible to place the load in the vehicle in a comfortable situation, in particular when the vehicle is subjected to a pitch rotation by the action of a frontal wind.

Advantageously, the use of a pitch parameter of the floor, representative of the pitch rotational acceleration of the floor makes it possible to adapt to variations in the pitch speed of the floor and makes it possible to make a dynamic correction of the inclination of the floor.

The control method may also have one or more of the following characteristics, taken alone or in combination.

According to one ~~embodiment~~example, the step of collecting a pitch parameter of the floor comprises collecting the value and the sign of the value of the pitch parameter of the floor, the control method comprising a step of comparing the value of the pitch parameter of the floor with a predetermined comfort pitch value, the step of determining a longitudinal correction command being implemented in the case where the value of the pitch parameter of the floor is greater than the comfort pitch value.

The arrangements previously described make it possible in particular to reduce the pitch rotational acceleration to a value less than the comfort pitch acceleration.

According to one ~~embodiment~~example, the longitudinal differential applied between two suspensions associated respectively with two rollers disposed longitudinally in the displacement direction of the vehicle is determined so as to maintain the acceleration of the load substantially perpendicular to the floor.

Thus, and advantageously, the longitudinal differential is configured to adapt to variations in the speed of the vehicle, in particular when it accelerates or decelerates on the track. It is therefore well understood that the longitudinal differential may lead to an inclination of the floor of the vehicle different from a horizontal inclination.

According to one ~~embodiment~~example, the force setpoint is applied by a command of the torque of a motor controlling a suspension.

According to one ~~embodiment~~example, the longitudinal correction command depends on the mass of the vehicle.

According to one ~~embodiment~~example, the control method comprises the following steps:

- collection of an acceleration parameter on the track, representative of the acceleration of the floor longitudinally in the displacement direction of the vehicle;
- modification of the longitudinal differential taking into account the acceleration parameter on the track.

According to one embodiment, the step of collecting an acceleration parameter on the track comprises collecting the value and the sign of the value of the acceleration parameter on the track, the control method comprising a step of comparing the value of the acceleration parameter on the track with a predetermined comfort floor acceleration value, the step of modifying the longitudinal differential being implemented

in the case where the acceleration parameter value on the track is greater than the comfort floor acceleration value.

The arrangements previously described make it possible to anticipate the movement of the floor of the vehicle in case of acceleration or braking.

Thus, according to one ~~embodiment~~example, the floor of the vehicle is inclined forwards in the case where the vehicle accelerates on the track.

Alternatively or in conjunction, the floor of the vehicle may be inclined rearward when the vehicle slows or brakes on the track.

According to one ~~embodiment~~example, the control method comprises the following steps:

- collection of a crushing parameter of the load, representative of the acceleration of the floor along an axis substantially perpendicular to the floor;
- determination of a normal correction command intended to modify the at least one force setpoint;
- application of the normal correction command to the set of suspensions, the vertical correction command being intended to drive the suspensions so as to bring back the crushing parameter of the load in one direction and with an intensity substantially close to the gravitational acceleration.

By substantially close intensity, is meant an intensity included in an interval of 2.5 m/s^2 centered around the intensity of the gravitational acceleration or more particularly in an interval of 1.6 m/s^2 centered around the intensity of the gravitational acceleration.

By substantially close direction is meant a direction included in an angular interval less than 5° with respect to the direction of the gravitational acceleration and more particularly in an angular interval less than 2.86° with respect to the direction of the gravitational acceleration.

According to one ~~embodiment~~example, the step of collecting a crushing parameter of the load comprises collecting the value and the sign of the value of the crushing parameter of the load, the control method comprising a step of comparing the value of the crushing parameter of the load, with a predetermined comfort normal acceleration value, the step of determining a normal correction command being implemented in the case where the crushing parameter value of the load is greater than the comfort normal acceleration value.

According to one ~~embodiment~~example, the control method comprises the following steps:

- collection of a roll parameter of the floor, representative of the roll rotational acceleration of the floor;

- determination of a lateral correction command intended to modify the at least one force setpoint;

- application of the lateral correction command to the set of suspensions, the lateral correction command being representative of a force setpoint lateral differential, said lateral differential being applied between two suspensions associated respectively with two rollers disposed laterally with respect to the displacement direction of the vehicle and being dependent on the distance between the two rollers and on the roll parameter of the floor.

According to one ~~embodiment~~example, the step of collecting a roll parameter of the floor comprises collecting the value and the sign of the value of the roll parameter of the floor, the control method comprising a step of comparing the value of the roll parameter of the floor, with a predetermined comfort roll value, the step of determining a lateral correction command being implemented in the case where the value of the roll parameter of the floor is greater than the comfort roll value.

According to one ~~embodiment~~example, the control method comprises the following steps:

- collection of a yaw parameter of the floor, representative of the yaw rotational acceleration of the floor, comprising the collection of the value and the sign of the value of the yaw parameter of the floor;

- comparison of the value of the yaw parameter of the floor, with a predetermined comfort yaw value;

- in the case where the value of the yaw parameter of the floor is greater than the comfort yaw value, determination of a yaw correction command intended to modify the at least one force setpoint

- application of the yaw correction command to the set of suspensions, the yaw correction command being representative of a yaw force setpoint differential, said yaw force setpoint differential being applied to one or several of the suspensions of the set of suspensions.

According to one ~~embodiment~~example, the steps of collecting the pitch parameter of the floor, the acceleration parameter on the track, the crushing parameter of the load, the roll parameter of the floor or the yaw parameter of the floor are carried out by an inclinometer or through a kinematic measurement device making it possible to know the 6 kinematic characteristics, such as for example an inertial unit. Said inclinometer or said kinematic measurement device being able to be included in the control command system.

According to one ~~embodiment~~example, the force setpoint applied to each suspension is configured so as not to be less than an adhesion limit force. In this way, the control

method makes it possible to avoid the sliding of the rollers on the support, in particular if a roller is unloaded.

According to one ~~embodiment~~example, the control method comprises a step of measuring the mass of the load and its distribution in the vehicle, the longitudinal differential and/or the lateral differential being dependent on the mass of the load and on the distribution of the mass in the vehicle.

According to one ~~embodiment~~example, the step of measuring the mass of the load is carried out by measuring the force on the rollers, in particular when stationary.

According to one embodiment, the step of measuring the mass of the load is carried out by strain gauges.

According to one ~~embodiment~~example, the control method comprises the following steps:

- measurement of the position of each of the rollers with respect to the vehicle;
- in the case where the position of a roller is outside a predetermined target interval, determination of a return command intended to modify the at least one force setpoint;
- application of the return command to the set of suspensions so as to bring the position of each of the rollers back to the target interval.

According to one ~~embodiment~~example, the step of determining a return command comprises a step of transmitting a speed reduction instruction to an external system for controlling the displacement speed of the vehicle, in the purpose of reducing the displacement speed of the vehicle.

The provisions previously described guarantee the slowing down of the vehicle in the case where it is not possible to maintain the stroke of the suspensions within a target interval, for example a safety interval. Thus and advantageously, the control method makes it possible to limit the speed of the vehicle, in particular when it is subjected to unforeseeable exogenous (wind, temperatures) or endogenous (passengers, other vehicles) phenomena.

According to one ~~embodiment~~example, the control method may comprise a step of blocking at least one suspension in predetermined positions. For example when the vehicle is stationary or when it has broken down.

According to one ~~embodiment~~example, the track comprises a plurality of track sections defined by a section type and in which the control command system comprises a position sensor, the control method comprising the following steps

- measurement of the position of the vehicle on the track;
- determination of a track section and a section type corresponding to the position of the vehicle on the track;

- modification of the comfort pitch value, the comfort floor acceleration value, the comfort normal acceleration value and the target interval in accordance with the section type.

According to one ~~embodiment~~example, the support comprises at least two cables stretched between at least two pylons, the vehicle being suspended by the cables above the ground through the rollers.

In general, the cables may be located at approximately the same altitude and present a substantially similar deformation profile on either side.

According to one ~~embodiment~~example, the comfort pitch value, the comfort floor acceleration value, the comfort normal acceleration value and the target interval evolve in accordance with the state of the track.

According to one ~~embodiment~~example, the comfort pitch value, the comfort floor acceleration value, the comfort normal acceleration value and the target interval are communicated by an operator or an external control unit.

According to one ~~embodiment~~example, the control method comprises a step of collecting shape data of the track representative of the shape of the travelling track extending upstream and a step of modifying the comfort pitch value and/or the comfort floor acceleration value and/or the comfort normal acceleration value and/or the target interval in accordance with the shape data of the track.

In particular, the step of collecting shape data of the track may be used to drive the set of suspensions according to a predetermined program, in accordance in particular with the collection of the pitch parameter of the floor, the collection of the acceleration parameter on the track, the collection of the crushing parameter of the load, the collection of the roll parameter of the floor, the collection of the yaw parameter of the floor or the position of the vehicle on the track and its mass.

~~The object of the invention may also be achieved thanks to the implementation of~~In a second aspect, the present disclosure provides an installation for transporting a load comprising a support comprising at least two stretched cables extending between at least two pylons so as to form a track on which a vehicle travels; the vehicle comprising rollers intended for contact on the support, a floor intended for transporting the load, said floor cooperating with the rollers through a set of suspensions, the set of suspensions having a travel and being controlled by at least one force setpoint defining the force exerted by each of the rollers on the floor and a control command system configured to drive the set of suspensions by a control method ~~of the type described previously~~according to the first aspect.

The transport installation may also have one or more of the following characteristics, taken alone or in combination.

According to one ~~embodiment~~example, the support, on which the wheels or the rollers are in contact, is a rail or a cable.

According to one ~~embodiment~~example, the vehicle comprises wheels in contact with the support.

According to one ~~embodiment~~example, each suspension of the set of suspensions may be equipped with a brake configured to allow its movement or alternatively slow down and/or block its movement.

According to one ~~embodiment~~example, the transported load comprises people.

According to one ~~embodiment~~example, the control command system comprises a kinematic measurement device configured to measure kinematic data of the floor of the vehicle, for example an inertial unit.

According to one ~~embodiment~~example, each suspension of the set of suspensions has a travel of between 1.5 m and 3.0 m.

According to one ~~embodiment~~example, the vehicle is self-propelled.

Brief description of the drawings

Other aspects, objects, advantages and characteristics of the invention will appear better on reading the following detailed description of preferred embodiments thereof, given by way of non-limiting example, and made with reference to the appended drawings on which ones:

[Fig. 1] is a sectional view of the vehicle according to one embodiment of the invention.

[Fig. 2] is a schematic view of the displacements in the space that may be undergone by the vehicle of Figure 1.

[Fig. 3] is a diagram illustrating an implementation mode of the control method according to one embodiment of the invention.

[Fig. 4] is a schematic view of the transport installation according to a first embodiment of the invention.

[Fig. 5] is a schematic view of the transport installation according to a second embodiment of the invention.

[Fig. 6] is a schematic view of the transport installation according to a third embodiment of the invention.

[Fig. 7] is a schematic view of the transport installation according to a fourth embodiment of the invention.

Detailed description

In the figures and in the remainder of the description, the same references represent identical or similar elements. In addition, the different elements are not represented to scale so as to favor the clarity of the figures. Furthermore, the different