Claims

[Claim 1]A brake particle trapping system (20) for trapping brake particles emitted by a disc brake (2), the brake particle trapping system (20) comprising:

- particle suction means (22, 24, 26), capable of adopting a first state in which the suction means (22, 24, 26) produce a first level of suction (p1), and a second state in which the suction means produce a second level of suction (p2) that is higher than the first level of suction (p1); and
- a control unit (30) that regulates the state of the suction means (22, 24, 26),

wherein the control unit (30) is configured to switch the suction means (22, 24, 26) from the first state to the second state when a disc rotational speed signal (34) representing a rotational speed of a disc (4) of the brake (2), received by the control unit (30), indicates that the disc (4), while being in an acceleration phase, has exceeded a first threshold rotational speed (W1).

[Claim 2] The brake particle trapping system (20) according to claim 1, wherein the first level of suction (p1) corresponds to no suction.

[Claim 3] The brake particle trapping system (20) according to claim 1, wherein the control unit (30) is configured to maintain the suction means (22, 24, 26) in the second state, after switching into it, for a time interval (Dt) of between 5 and 30 seconds, and then, after this time interval (Dt), to switch the suction means (22, 24, 26) back to the first state.

[Claim 4] The brake particle trapping system (20) according to claim 1, wherein the control unit (30) is configured to switch the suction means (22, 24, 26) from the second state to the first state if the following two conditions are met:

- the disc rotational speed signal (34), received by the control unit (30), indicates that the disc (4), which is in a deceleration phase, has fallen below a second threshold rotational speed (W2); and
- the disc brake (2) is inactive.

[Claim 5] The brake particle trapping system (20) according to claim 4, wherein the second threshold rotational speed (W2) is equal to the first threshold rotational speed (W1).

[Claim 6] The brake particle trapping system (20) according to claim 4, wherein the switchover of the suction means (22, 24, 26) from the second state to the first state occurs after a delay of 10 to 15 seconds during which both these conditions remain satisfied.

[Claim 7]The brake particle trapping system according to claim 1, wherein the control unit (30) is configured to maintain the suction means (22, 24, 26) in the second state from the moment the disc rotational speed signal (34) indicates that the disc (4) is rotating at a speed greater than a third threshold rotational speed (W3).

[Claim 8]The brake particle trapping system according to claim 7, wherein the third threshold rotational speed (W3) is equal to at least one of: the first threshold rotational speed (W1); and the second threshold rotational speed (W2).

[Claim 9] A motor vehicle or rail vehicle (1) comprising:

- a disc brake (2);
- a brake particle trapping system (20) for trapping brake particles emitted by the disc brake (2); and
- means for detecting the speed of the vehicle,

the trapping system (20) comprising:

- particle suctioning means (22, 24, 26), capable of adopting a first state in which the suction means (22, 24, 26) produce a first level of suction (p1), and a second state in which the suction means produce a second level of suction (p2) that is higher than the first level of suction (p1); and
- a control unit (30) that regulates the state of the suction means (22, 24, 26),

wherein the control unit (30) is configured to switch the suction means (22, 24, 26) from the first state to the second state when a speed signal emitted by the means for detecting the speed and received by the control unit (30) indicates that the vehicle (1), while being in an acceleration phase, has exceeded a speed of between 40 and 60 km/h.

[Claim 10] A method (1000) for calibrating a particle trapping system, the particle trapping system comprising:

- particle suction means (22, 24, 26), capable of adopting a first state in which the suction means (22, 24, 26) produce a first level of suction (p1), and a second state in which the suction means produce a second level of suction (p2) that is higher than the first level of suction (p1); and
- a control unit (30) that regulates the state of the suction means (22, 24, 26),

wherein the control unit (30) is configured to switch the suction means (22, 24, 26) from the first state to the second state when a disc rotational speed signal (34) representing a rotational speed of a disc (4) of the brake (2), received by the control unit (30), indicates that the disc (4), while being in an acceleration phase, has exceeded a first threshold rotational speed (W1), the method comprising, in this order:

- providing (100) a disc brake (2) comprising the disc (4), a caliper (8), and a pair of linings (10, 12);
- causing the disc (4) to rotate (200);
- activating the brake (300) by applying force to the linings (10, 12) in contact with the disc (4);

- stopping the activation of the brake (400);
- accelerating the disc (500), during which the particles emitted by the brake (2) are detected and the rotational speed (W) of the disc (4) is measured;
- determining (600) the variations in particle emission as a function of the rotational speed (W) of the disc (4);
- identifying a peak (700) in particle emissions over these variations;
- determining (800) a specific value (Wa) for the rotational speed of the disc (4) that corresponds to the emission peak; and
- configuring (900) the control unit (30) of the trapping system (20) with said specific value (Wa) as the first threshold rotational speed (W1).

[Claim 11] Calibration method according to claim 10, further comprising:

- measuring (850) a residual braking torque when the brake is inactive; and
- configuring (900) the control unit according to the following principles:
  - o if the residual braking torque (Cb) is greater than a threshold value for residual braking torque, the control unit (30) is configured to maintain the suction means in the second state from the moment the signal for the rotational speed of the disc indicates that the disc is rotating at a speed greater than a threshold rotational speed (W1); and
  - o if the residual braking torque (Ca) is less than the threshold value for residual braking torque, the control unit (30) is configured to maintain the suction means in the second state, after the switchover from the first state, for a time interval of between 5 and 30 seconds, preferably between 10 and 15 seconds, and then, after this time interval, to switch the suction means back to the first state.

[Claim 12] A method for controlling a brake particle trapping system (20) for trapping brake particles from a disc brake, the trapping system comprising particle suction means, the method comprising:

- detecting the rotational speed (W) of the disc (4); and
- when the rotational speed of the disc exceeds a first threshold rotational speed (W1), switching the state of the suction means from a first state in which the suction means produce a first level of suction (p1), to a second state in which the suction means produce a second level of suction (p2) that is higher than the first level of suction (p1).

[Claim 13] Method according to claim 12, wherein the particle trapping system (20) comprises:

particle suction means (22, 24, 26), capable of adopting a first state in which the suction means (22, 24, 26) produce a first level of suction (p1), and a second state in which the suction means produce a second level of suction (p2) that is higher than the first level of suction (p1); and

a control unit (30) that regulates the state of the suction means (22, 24, 26),

wherein the control unit (30) is configured to switch the suction means (22, 24, 26) from the first state to the second state when a disc rotational speed signal (34) representing a rotational speed of a disc (4) of the brake (2), received by the control unit (30), indicates that the disc (4), while being in an acceleration phase, has exceeded a first threshold rotational speed (W1).

[Claim 14] Method according to claim 12, wherein the particle trapping system is calibrated by a calibration method comprising:

- measuring (850) a residual braking torque when the brake is inactive; and
- configuring (900) the control unit according to the following principles:
    - o if the residual braking torque (Cb) is greater than a threshold value for residual braking torque, the control unit (30) is configured to maintain the suction means in the second state from the moment the signal for the rotational speed of the disc indicates that the disc is rotating at a speed greater than a threshold rotational speed (W1); and
    - o if the residual braking torque (Ca) is less than the threshold value for residual braking torque, the control unit (30) is configured to maintain the suction means in the second state, after the switchover from the first state, for a time interval of between 5 and 30 seconds, preferably between 10 and 15 seconds, and then, after this time interval, to switch the suction means back to the first state.