CLAIMS

1. A wheel testing system adapted for testing a μ-S characteristic of a wheel of a railroad vehicle, the wheel testing system comprising:

a first testing device including a rail on which a test wheel rolls;

a second testing device including a rail wheel that rotates together with the test wheel while being in contact with the test wheel; and

a test data processing device that processes pieces of test data of μ-S characteristics obtained by the first testing device and the second testing device,

wherein the test data processing device converts the μ-S characteristics by the second testing device into the μ-S characteristic that can be obtained by the first testing device based on the μ-S characteristics by the first testing device and the μ-S characteristics by the second testing device.

2. The wheel testing system according to claim 1,

wherein the test data processing device:

compares the μ-S characteristics by the first testing device with the μ-S characteristics by the second testing device;

determines, based on a result of the comparison, a correction formula for converting the μ-S characteristics by the second testing device into the μ-S characteristics by the first testing device; and

converts the μ-S characteristics by the second testing device into the μ-S characteristics that can be obtained by the first testing device using the correction formula.

3. The wheel testing system according to claim 2,

wherein the test data processing device:

determines the correction formula based on the μ-S characteristics by the first testing device and the second testing device within a first speed range being a slow speed range within which the test can be performed with both the first testing device and the second testing device; and

converts the μ-S characteristics by the second testing device within a second speed range being a high speed range faster than the first speed range into the μ-S characteristics that can be obtained by the first testing device within the second speed range using the

correction formula, wherein the second speed range is a speed range within which it is difficult to conduct the test with the first testing device.

4. The wheel testing system according to claim 2 or claim 3,

wherein the test data processing device determines the correction formula by regression analysis of a curve of an error between the μ-S characteristic by the second testing device and the μ-S characteristic by the first testing device.

5. The wheel testing system according to claim 4,

wherein the test data processing device determines the correction formula by the regression analysis with a slip ratio S as an explanatory variable and a friction coefficient error μ_2-μ_1 as an objective variable,

where μ_1 is a friction coefficient measured by the first testing device, and μ_2 is a friction coefficient measured by the second testing device.

6. The wheel testing system according to claim 2 or claim 3,

wherein the test data processing device determines the correction formula by a regression analysis with a slip ratio S as an explanatory variable and a friction coefficient ratio μ_1/μ_2 as an objective variable,

where μ_1 is a friction coefficient measured by the first testing device, and μ_2 is a friction coefficient measured by the second testing device.

7. The wheel testing system according to any one of claims 1 to 6,

wherein the first testing device includes:

a carriage that rotatably holds the test wheel and is capable of traveling along the rail with the test wheel in contact with the rail; and

test wheel driving means that drives the test wheel,

wherein the test wheel driving means includes:

rotational motion supplying means that supplies a rotational motion of a rotation speed corresponding to a speed of the carriage; and

a slip ratio control device that controls a slip ratio between the rail and the test wheel by changing a phase of the rotational motion supplied from the rotational motion supplying means.

8. The wheel testing system according to any one of claims 1 to 6,

wherein the first testing device includes:

a carriage that rotatably holds the test wheel and is capable of traveling along the rail with the test wheel in contact with the rail; and

test wheel driving means that drives the test wheel,

wherein the test wheel driving means includes:

rotational motion supplying means that supplies a rotational motion of a rotation speed corresponding to a speed of the carriage; and

torque generating means that generates a predetermined torque to be applied to the test wheel by changing a phase of the rotational motion supplied from the rotational motion supplying means.

9. The wheel testing system according to any one of claims 1 to 8,

wherein the second testing device includes:

a rail wheel support part that rotatably supports the rail wheel;

a wheel support part that rotatably supports the test wheel such that the test wheel is in contact with the rail wheel;

a first electric motor that rotates the rail wheel and the test wheel; and

a slip ratio control device that controls a slip ratio between the test wheel and the rail wheel,

wherein the slip ratio control device includes:

a rotating frame rotationally driven by the first electric motor; and

a second electric motor attached to the rotating frame,

wherein at least one of the rail wheel and the test wheel is connected to the first electric motor via the slip ratio control device.

10. The wheel testing system according to claim 9,

wherein the slip ratio control device includes a speed reducer that reduces rotation output by the second electric motor,

wherein a speed reduction ratio of the speed reducer is within a range of 45/1 to 120/1.

11. The wheel testing system according to any one of claims 1 to 8,

wherein the second testing device includes:

a rail wheel support part that rotatably supports the rail wheel;

a wheel support part that rotatably supports the test wheel such that the test wheel is in contact with the rail wheel;

a first electric motor that rotates the rail wheel and the test wheel; and

a torque generator that controls a slip ratio between the test wheel and the rail wheel,

wherein the torque generator includes:

a rotating frame that is rotationally driven by the first electric motor; and

a second electric motor attached to the rotating frame,

wherein at least one of the rail wheel and the test wheel is connected to the first electric motor via the torque generator.

12. The wheel testing system according to claim 11,

wherein the torque generator includes a speed reducer that reduces rotation output by the second electric motor,

wherein a speed reduction ratio of the speed reducer is within a range of 45/1 to 120/1.

13. The wheel testing system according to any one of claims 9 to 12,

wherein the second testing device is configured to be controllable in accordance with a procedure including:

a fist step of controlling driving of the second electric motor so that no load is applied to the test wheel;

after the first step, a second step of controlling driving of the second electric motor so that a predetermined torques is applied to the test wheel; and

after the second step, a third step of controlling driving of the second electric motor so that no load is applied to the test wheel,

wherein the first step includes a step of controlling driving of the first electric motor so that a rotation speed of the rail wheel increases up to a predetermined value, and

wherein the third step includes a step of controlling driving of the first electric motor so that the rotation speed of the rail wheel decreases and the rail wheel stops rotating.

14. The wheel testing system according to any one of claims 9 to 13,

wherein an inertia moment of a rotating part of the second electric motor is 0.01kg·m^2 or less.

15. The wheel testing system according to any one of claims 9 to 14, including a transmission capable of shifting gears for the rotation output by the first electric motor.