Special Feature: Drivetrain and Braking Technology

Overview

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The proverb “you cannot see the wood for the trees” means that you cannot see the overall situation because you are only focusing on the details. We researchers should keep this in mind in order to better define our goals and more efficiently push technological development forward. On the other hand, if you only see the forest, you may overlook slight changes in the individual trees which make up the forest, for example, damage from disease or harmful insects, an outbreak of parasitic plants, and the fire hazard from fallen trees. Furthermore, you might overlook signs of change in the environment as a whole, affecting not only the forest, but also the area surrounding the forest. Therefore, it goes without saying that it is necessary for us to see things from two points of view, i.e., from the macroscopic and microscopic viewpoints, so that we can see the forest and the trees simultaneously.

In this issue, we focus on four techniques connected with the basic function of acceleration and deceleration of vehicles, from macroscopic and microscopic viewpoints. The first and second articles discuss transmission control systems from the macroscopic viewpoint, dealing with technical methods used to ensure the robustness of control system performance against various disturbances inherent in these systems. The third and fourth articles develop an analysis of the microscopic phenomena which occur in key vehicle components, the core of the transmission and brakes, respectively, based on their dynamic mechanisms and tribology. Specifically, individual phenomena are clarified by precise behavior measurement of the metal elements constituting a V-belt used in a continuously variable transmission and measurement of contact conditions between brake pads and disks.