Discussion

Yoichi Ando

Q: What are the technical problems related to the maintenance and management of the Shinkansen?
A: The problem is that maintenance and management rely on human power. Maintenance and management of both the rolling stock and the train line are not easy.

Q: What is the delay time distribution of the Shinkansen?
A: The average delay time (0.4 minutes) per train includes shutdowns due to natural disasters such as typhoons and floods. Without such natural disasters, average delay time is several seconds.

Q: Is high-tech sensing used for maintenance and management of the Shinkansen?
A: Image or thermal scanning is used for maintenance and management of tunnels, to check damages to the walls.

Q: What is the progress of the superconductivity of the Maglev car?
A: The superconductivity material is niobium titanium cooled by helium. Obstacles to safety due to the use of the superconductivity motor are removed by eliminating vibration of the train. There are no specific safety problems at the low temperature.

Q: Is the carbonation of concrete reversible? If it is reversible, can we solve the problem of carbonation by activating the reverse chemical reaction?
A: Carbonation is reversible but at an extremely high cost. Therefore, in principle, carbonation can be solved by increasing the alkalinity of concrete.

Q: What are the effects of the magnetic field of the Maglev car on passengers?
A: Because of the sufficient magnetic shielding of the Maglev car, the strength of the magnetic field inside the car is approximately 5 Gauss, a level at which there are no effects on the human body. However, developments to further reduce the effects of the magnetic field at all sites might be necessary.

Q: Is it possible to predict deterioration of the Shinkansen train line?
A: For the Shinkansen, prediction is easier because in most cases construction data at the time of installation is available.

Michael D. Todd

Q: Can optical fibers be damaged?
A: The optical fiber itself is not damaged. However, the portions adhering to the structure can be damaged.

Q: Do fiber optic sensors have a durability problem when compared with other sensors?
A: We have attached fiber optic sensors and strain gauges to a marine vessel cruising to the North Pole and monitored the vessel's body. The fiber optic sensors are not damaged, but the strain gauges are all damaged. As a result, the fiber optic sensors have no durability problem when compared with a strain gauge that is a conventional sensor.

Q: We understand that fiber optic sensors can detect strain in the axial direction. Can it detect strain in directions other than the axial direction? Can the inside of materials be detected from the surface with the use of fiber optic sensors?
A: Strain in every direction can be measured when the fiber optic sensors are bent. The inside of material can also be measured, in principle, when a number of optical fibers are used, but actual measurement will be difficult.

Q: When fiber optic sensors are installed in the roads, can we differentiate the strain caused by the passage of vehicles from the strain caused by other things, such as wind?
A: We can differentiate strain caused by passage of vehicles from strain by other causes when looking up the time-log of the fiber optic sensors.

Q: Can fiber optic sensors be used for measurement of living organisms?
A: Yes, they can.

Q: What is the durability of the material of optical fibers?
A: It deteriorates when exposed to ultraviolet rays or radioactive rays but will not deteriorate under normal operating conditions.

Q: You explained the method of identifying vehicles breaking speed limits or weight limits by using fiber optic sensors installed in the roads. Is this actually being implemented?
A: It is not. We simply provide the measurement data to the road administrators. Use of fiber optic sensors in such way requires a decision by road administrators. Fiber optic sensor data cannot be used at present as evidence admissible in court for traffic violations.

Chris Thewalt

Q: What are the dynamic characteristics of the laser scanner?
A: Scan of a single line can be implemented at the rate of 30 Hz.

Q: Are there any problems in handling the large amount of scanned data?
A: Transfer of the scanned data can be a problem. A high-speed transfer is required. Compression of the measurement data is also used.

Q: Laser scanners that are installed in aircraft cannot scan structures having complex shapes. How about laser scanners installed on the ground?
A: The 3-D scan of the detailed shape is possible from a distant location. Structures having complex shapes are measured by the scanner in practice.

Q: What are the differences between the 3-D scan and the 2-D scan?

A: The 3-D scan is used to measure the shape of structures. On the other hand, the 2-D scan is used to measure color of the various portions of structures. In order to measure the profile of an object with a laser scanner, a number of 3-D point scans are required. The 3-D scan and the 2-D scan are used separately in this way.

Q: Is the laser scanner hazardous to the eyes?
A: It creates no problem unless the eye is exposed directly to the laser at a short distance, which is an abnormal situation.

Q: What is the device of the laser scanner?
A: Because this is a product of a specific company, I am not showing it during my presentation. It is so compact that transportation is also possible. I will show it to you later if you are interested.

Kazuo Kashiyama

Q: How do you simulate a municipal fire?
A: We calculate the spread of fires using an empirical formula.

Q: I cannot understand why you use an empirical formula in the simulation of municipal fire even through you have created a precise physical model of the city.
A: The empirical formula we use is a rational formula that is based on the result of experiments of fire spreading. This is not a pure empirical formula.

Q: What are the input data for the simulation of the Ise Bay typhoon?
A: The track and strength of the typhoon. We have made calculations by varying the track and strength of the typhoon and adopted the track and strength such that the computed result matches the actual measured water level in the bay.

Q: Can you calculate using the simulation of cities?
A: Yes.

Q: In your simulation of the Ise Bay typhoon, you are using the areas that are the combinations of the elements obtained by finely dividing the Pacific Ocean. Why does each area have a strange shape like the wing of a bird?
A: This is the result of the method of creating the areas by combining the various elements. We have assigned numbers to all elements beforehand. First, we have selected an element having the smallest number. Then, we have created an area by combining the elements that surround the selected element. After repeating the procedure of selecting the elements having the smaller numbers and selecting the elements surrounding the selected element, the unusual shape of the area resulted.

Q: What are the applications of the simulation of cities?
A: We are considering simulating the municipal activities themselves.

Q: How much computational effort is required in large-scale computation?
A: When we make an accurate simulation of winds in a city, we have to take the turbulent flow of winds into consideration. It requires the discretization of the air

domain to a size sufficiently smaller than the size of the turbulent flow of winds. The discretization requires large-scale calculations that will probably be possible 30 years from now assuming that the present rate of technical advances in computers keeps progressing.

Q: Do you see any problems in the GIS data that are used in creating the municipal model?
A: Data concerning housing and buildings are available. However, data concerning public facilities such as expressways are not available. This is a problem.