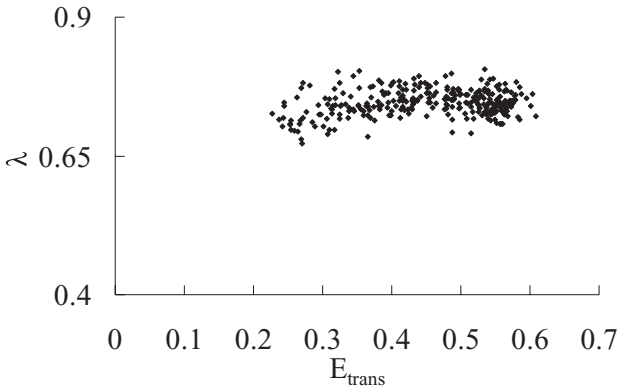

Fig. 12. Subjective results from the $E_{\text{trans}} - \lambda$ plane.

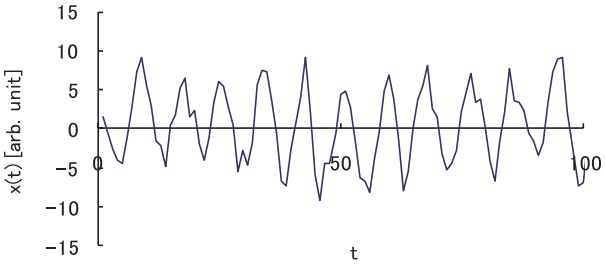

Fig. 13. A graph of the numerical solution obtained using stochastic differential equation (2) for $\mu = 11$.

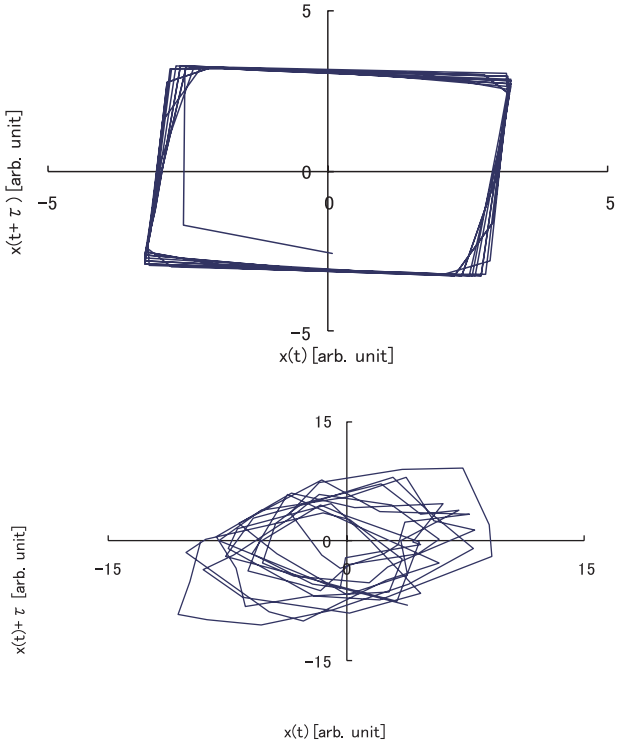

Fig. 14. (a) An attractor reconstructed from the numerical solution obtained using van der Pol equations, as shown in Fig. 6. (b) An attractor reconstructed from the numerical solution obtained using the stochastic differential equations, as shown in Fig. 13.

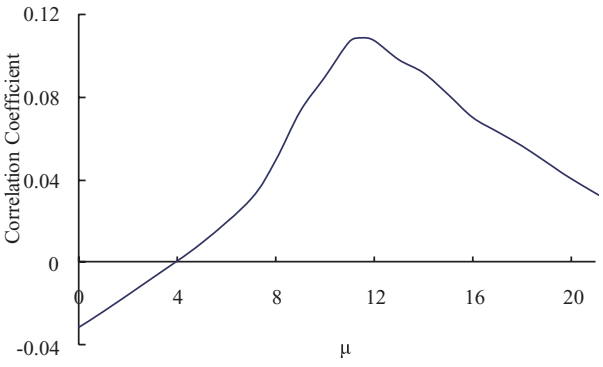

Fig. 15. A graph of the cross correlation function for the periodic function $s(t)$ and numerical solutions.

been reported. Creating precise models of normal EGG in healthy individuals may lead to the quantitative differentiation of EGG abnormalities associated with gastrointestinal disorders. This increases the possibility of diagnosing asymptomatic gastrointestinal disorders such as nonulcerative dyspepsia by EGG and the application of automatic EGG to screening. EGG is thus expected to contribute to the early detection and prevention of gastrointestinal disorders associated with various diseases.

Nelsen and Sarna *et al.* described electrical activities of the canine stomach using the Van der Pol equation, which explains self-oscillatory systems (Nelsen and Becker, 1968; Sarna *et al.*, 1971). However, the Van der Pol equation is a deterministic differential equation. In addition, our analysis using the Wayland algorithm showed that actual EGG records are not necessarily composed of deterministic mathematical models (Matsuura and Takada, 2009). We are, therefore, attempting a description using stochastic differential equations (Matsuura and Takada, 2009).

5. Future Research Directions

Recently, disorders associated with abnormal gastrointestinal activities such as FD have emerged as problems. However, in FD, gastrointestinal symptoms are complained of despite the absence of organic abnormalities, and it is presently diagnosed basically by inquiry. In the future, FD may be detected and diagnosed by EGG, and EGG is expected to be useful for the prevention and early treatment of gastrointestinal disorders associated with various diseases. In addition, as shown in previous studies, it may also be applied to the evaluation of burdens due to overtime work or stressful situations, management of work burdens, and screening for gastrointestinal diseases.

The health management of astronauts during prolonged stays on the international space station is an important problem. However, as the station cannot be equipped with large examination instruments such as endoscopic and radiographic systems, ECG and blood pressure are monitored, and inquiries and counseling are made by physicians. Research on EGG in the space shuttle is being conducted in view of its application to the health management of astronauts (Deborah *et al.*, 2002). EGG may also contribute to clarification of the mechanism of space motion sickness.

Endoscopy and barium radiography are invasive exami-