

Development of a simulation based experience system for Tsunami using VR technology

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A number of tsunami disasters occur annually in various parts of the world. Recently, the evacuation analysis is well used in order to investigate the damage of human being. Also, the visualization based on VR technology is becoming popular to understand the physical phenomena. The present authors developed a simulation based experience system based on the virtual reality (VR) technology using the result of evacuation analysis[1]. The results of tsunami and evacuation simulation are visualized by the stereoscopic view in the VR space (CAVE). As the view from the refugee's eye can be created in the VR space, the users can understand the feeling of refugee easily. However the auditory information for tsunami sound is not considered in this system.

This paper presents a simulation based experience system for tsunami considering the auditory information based on the VR technology in order to improve the reality. The tsunami sound level is evaluated by the geometric acoustic theory in order to realize the real time computing. The stereoscopic sound field is created in VR space by the method of ambisonics [2]. The present system is shown to be a useful tool to investigate the disaster prevention and mitigation for tsunami waves.

REFERENCES

- [1] Takeshi Kawabe, Kazuo Kashiyama, Hiroshi Okawa and Hide Miyachi (2014) Development of Simulation System for Tsunami Evacuation Using Virtual Reality Technology. APCOM&ISCM:MS-108.
- [2] Ward, D.B. and Abhayapala, T.D (2001) Reproduction of a plane-wave sound field using an array of loudspeakers, IEEE Transactions on Speech and Audio Processing, vol.9 :697-707.