

Evaluation of self-healing performance in concrete using nonlinear resonance spectroscopy

*Hajin Choi¹⁾ and Ryulri Kim²⁾

^{1), 2)} School of architecture, Soongsil University, Seoul 06978, Korea

¹⁾ hjchoi@ssu.ac.kr

²⁾ 20141915@soongsil.ac.kr

ABSTRACT

In this study, monitoring self-healing performance of the concrete is presented using impact-based nonlinear resonance spectroscopy. Two type of concrete specimens containing capsule type self-healing materials and supplementary cementitious materials, crystalline admixtures were tested. Specimens had a single vertical crack (0.25 and 0.30 mm width) and nonlinear resonance spectroscopy tests were conducted to monitor frequency shift which is nonlinear response in flexural and longitudinal vibration modes. Also, multiple impact method and single impact method were applied to measure frequency shift of specimens for 63 days of self-healing process. The results show that nonlinear resonance spectroscopy has a great potential of evaluation for self-healing process in concrete.

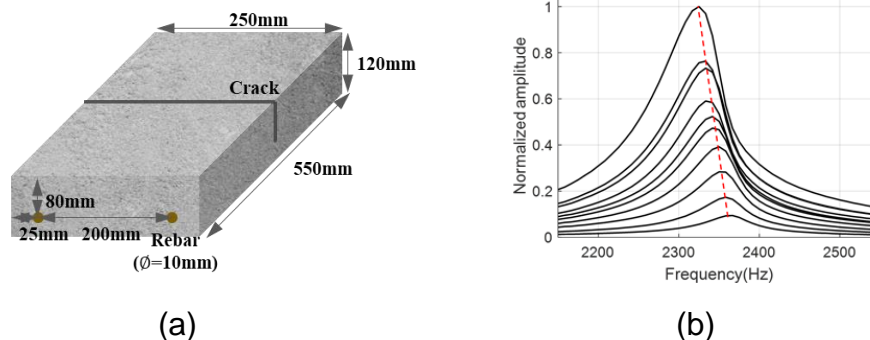


Fig. 1 Self-healing specimen(a) and nonlinear test result(b)

REFERENCES

- B. Mota, T. Matschei and K. Scrivener, (2015), "The influence of sodium salts and gypsum on alite hydration", *Cement and Concrete Research*, **75**, 53–65.
- K. E.A. Van Den Abeele, J. Carmeliet, J. A. Ten Cate and P. A. Johnson, (2000), "Nonlinear Elastic Wave Spectroscopy (NEWS) techniques to discern material damage, Part II: Single-mode Nonlinear Resonance Acoustic Spectroscopy", *Journal of Research in Nondestructive Evaluation*, **12**, 31–42

¹⁾ Professor

²⁾ Graduate Student