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THE RAYLEIGH DAMPING IN POLIMERIC COMPOSITES WITH COOPER SPHERICAL MICROPARTICLES

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In this work, a nondestructive, analytical - experimental methodology was developed using an experimental modal analysis and the Rayleigh damping model. It allows to obtain the natural vibration frequencies, the damping capacity and the dynamic elastic constants of a polymeric composite material. The material was made of epoxy resin reinforced with spherical copper microparticles.

The composite material was designed in order to damping vibrations trough of spherical copper particles (Fig. 1). These particles are a passive medium that provides the vibrations suppression.

The experimental modal analysis is a technique that it can be used to determine the natural vibration frequencies of a compound material. Due to it allows to identify the vibration ways and the materials damping capacity. In the proposed methodology, the natural vibration frequencies are used as the input data, in order to predict the damping capacity of these composite materials. Moreover, with these frequency values, it would be possible to determine the effective global elastic constants of the compound material (which are validated by means of the corresponding mechanical tests). Due to the natural frequencies of vibration contain inherent information related to the mass and the rigidity of the system.

The Rayleigh damping model is a proportional damping model that does not include a nonlinear effects and it assumes: that the damping matrix must be a linear combination of the mass matrix and rigidity matrix. However, the damping answer (vibrations) for the relatively small stress (low frequencies), can be considered like a linear phenomenon. In this work, the graph (Fig. 2) corresponding to Rayleigh damping for the reinforced polymeric material composed with spherical copper particles.

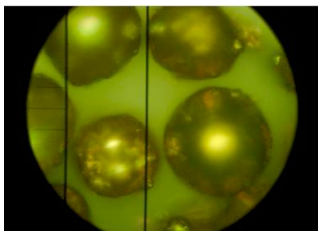


Fig. 1 Copper microparticles

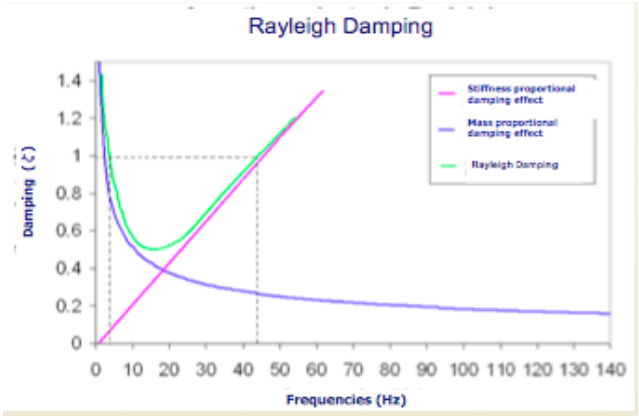


Fig. 2 Rayleigh Damping

Biography

Miriam Sánchez Pozos has completed his PhD from Universidad Autónoma del Estado de México. She is a professor of Materials Science and Plastics Engineering. She has directed thirteen jobs in undergraduate and graduate degrees in mechanical engineering. She has published two book chapters. She is an active member of the International Materials Research Society (IMRS) and the Mexican Society of Mechanical Engineering (SOMIM). She has published 4 articles in international journals. She also collaborates as an article reviewer for Elsevier and as a book reviewer for the IMRS.

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