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Computational homogenization of a recycled composite material based on PET and wood particles

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Valorising household solid waste through the creation of new products based on recycled materials is a necessary task to meet the new Chilean environmental demands [1]. During the last 30 years, the plastic and wood composites are been used to obtain materials lighter than wood, more resistant to moisture and insects and with mechanical properties higher to plastic, but only recently recycled plastic has been suited as structural materials [2].

To reduce the cost and time of experimental tests into the design of a new composite material made from recycled polyethylene terephthalate (PET) and Chilean radiate pine's particles [3], this work proposes a study of the elastic properties using the classical homogenization theories (Voigt, Reuss and Periodic) combined with simulations of the representative volume element (RVE) in ANSYS [4] and DIGIMAT software.

Density, modulus of elasticity and Poisson's coefficients are compared for composites made with 0.1 to 0.5 volume ratio of wood particles. From the results, different configurations of plastic-wood material are proposed for further numerical-experimental comparisons.

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