Abstract

Title: Evaluation of wind resistance for an innovative recycled plastic greenhouse

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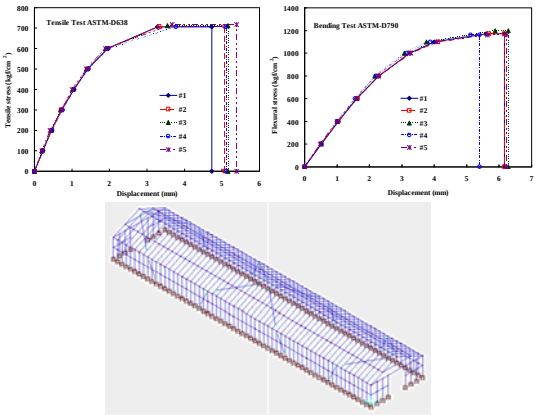
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I. Abstract

A recycled plastic material made of Polyethylene terephthalate (PET), Nylon, and glass fiber reinforced Nylon and designated as PA6GF plastic was applied to the main structural members of a simplified greenhouse in this study. Comparisons between the mechanical properties of the traditional galvanizing steel and the PA6GF plastic were made to estimate the section dimensions required for the recycled plastic simplified greenhouse. Structural performance of galvanized steel and PA6GF plastic greenhouse models were evaluated under designated wind loads. Linearly static analysis results revealed that under the Beaufort-scale 11 wind loadings, the greenhouse models designed with plastic pipes of 5 cm diameter and 1 cm thickness and with plastic tubes of 5 cm width and 1 cm thickness could have maximum displacement response and section forces similar to that of the galvanized steel greenhouse. The sectional moment demand could be larger than the flexural strength for the steel greenhouse, which implied probable damage to the structural members. On the contrary, no flexural damage was revealed for the plastic greenhouses. Thus, the analysis results indicated that with appropriate design, the PA6GF plastic could be an alternate material for the construction of the simplified greenhouse frames.

II. Image:



III. Reference:

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4 NGMA, Structural Design Manual, 2013. The National Greenhouse Manufacture Association (NGMA), Harrisburg, PA 17112.

IV. Biography:

M. H. Tsai has completed his PhD from National Taiwan University in 1998 and worked as a postdoctoral research associate in Tokyo Institute Technology in 2001. He is current a professor at the department of civil engineering, National Piingutng University of Science and Technology, Taiwan. He has published more than 40 papers in reputed journals and has been awarded as an outstanding reviewer of reputed journals.

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