Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Modeling of Nonlinear Mechanical Response in CFRP Angle-Ply Laminates SHINJI OGIHARA, Tokyo University of Science — It is known that the failure process in angle-ply laminate involves matrix cracking and delamination and that they exhibit nonlinear stress-strain relation. There may be a significant effect of the constituent blocked ply thickness on the mechanical behavior of angle-ply laminates. These days, thin prepregs whose thickness is, for example 50 micron, are developed and commercially available. Therefore, we can design wide variety of laminates with various constituent ply thicknesses. In this study, effects of constituent ply thickness on the nonlinear mechanical behavior and the damage behavior of CFRP angle-ply laminates are investigated experimentally. Based on the experimental results, the mechanical response in CFRP angle-ply laminates is modeled by using the finite strain viscoplasticity model. We evaluated the mechanical behavior and damage behavior in CFRP angle-ply laminates with different constituent ply thickness under tensile loading experimentally. It was found that as the constituent ply thickness decreases, the strength and failure strain increases. We also observed difference in damage behavior. The preliminary results of finite strain viscoplasticity model considering the damage effect for laminated composites are shown. A qualitative agreement is obtained.

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Date submitted: 11 Nov 2013 Electronic form version 1.4