Dynamic Characterization of Porcine Lung Tissue[1] BRETT SAN-
BORN, XU NIE, WEINONG CHEN, Purdue University, TUSIT WEERA-
SOORIYA, Army Research Laboratory — In this study, the dynamic shear and
uniaxial compressive response of porcine lung tissue was examined using modified
Kolsky bar techniques. High rate compression data was collected using a hollow
transmission bar to amplify weak material response. Radial deformation of annular
specimens was captured by a modified Kolsky bar and high speed camera. The
images depicted inhomogeneous specimen deformation induced by radial inertia ef-
fects, which compromised the validity of such high rate compression test techniques.
A novel torsion technique was developed to obtain dynamic pure shear behavior of
lung tissue. The equivalent stress-strain behavior of lung tissue obtained from both
methods was compared and the pure shear response was found to be an order of
magnitude lower than the uniaxial compressive response. These results indicate the
previously established annular specimen technique for the Kolsky bar soft materi-
als characterization, targeted on reducing the influence of inertia stress, may still
have underestimated the effects of radial inertia and the associated inhomogeneous
deformation in materials as soft as lung tissues.

Brett Sanborn
Purdue University

Date submitted: 16 Feb 2011

Electronic form version 1.4