

NEW GENERATION OF SURFACE TREATMENTS



University of Maryland
Vibration & Noise Control Lab.



ACTIVE & PASSIVE SURFACE TREATMENTS



Piezo-actuator



ACTIVE PIEZO-PATCHES

Passive Constraining Layer

VEM



PASSIVE CONSTRAINED LAYER DAMPING

Piezo-constraining Layer

VEM

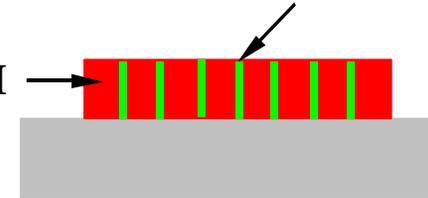


ACTIVE CONSTRAINED LAYER DAMPING

(Shear Damping)

Piezo-fibers

VEM

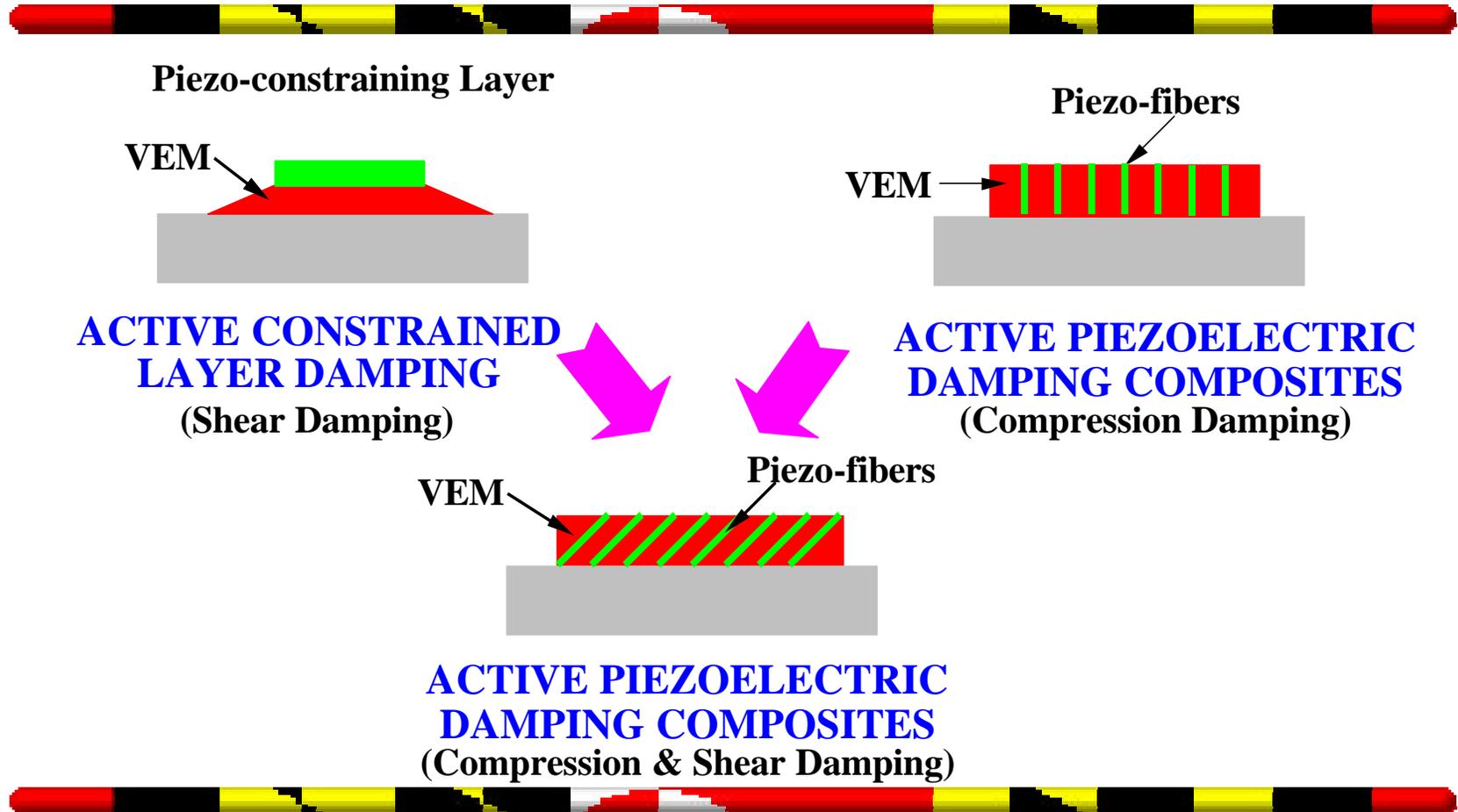


ACTIVE PIEZOELECTRIC DAMPING COMPOSITES

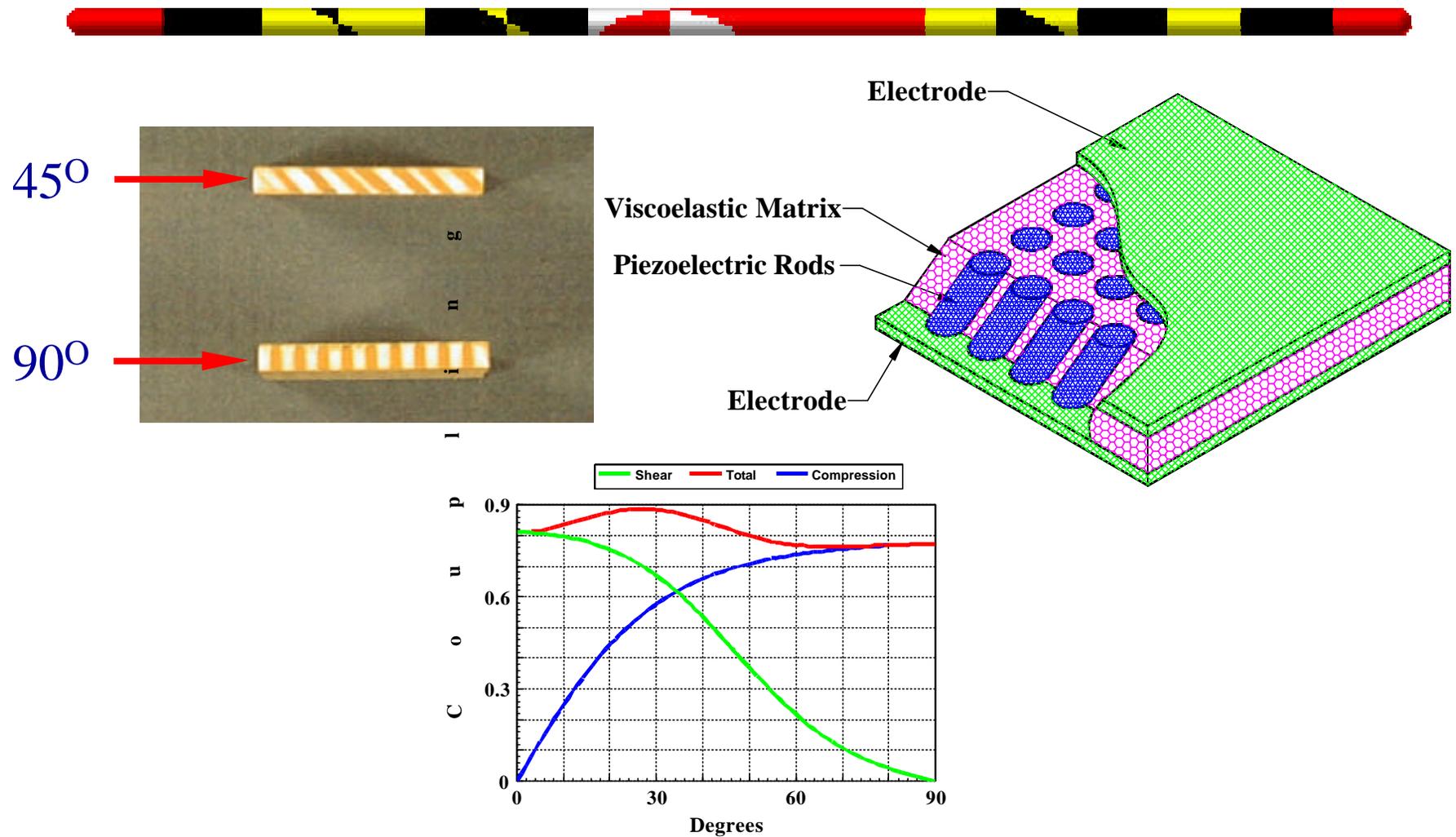
(Compression Damping)



A NEW CLASS OF ACTIVE PIEZOELECTRIC DAMPING COMPOSITE



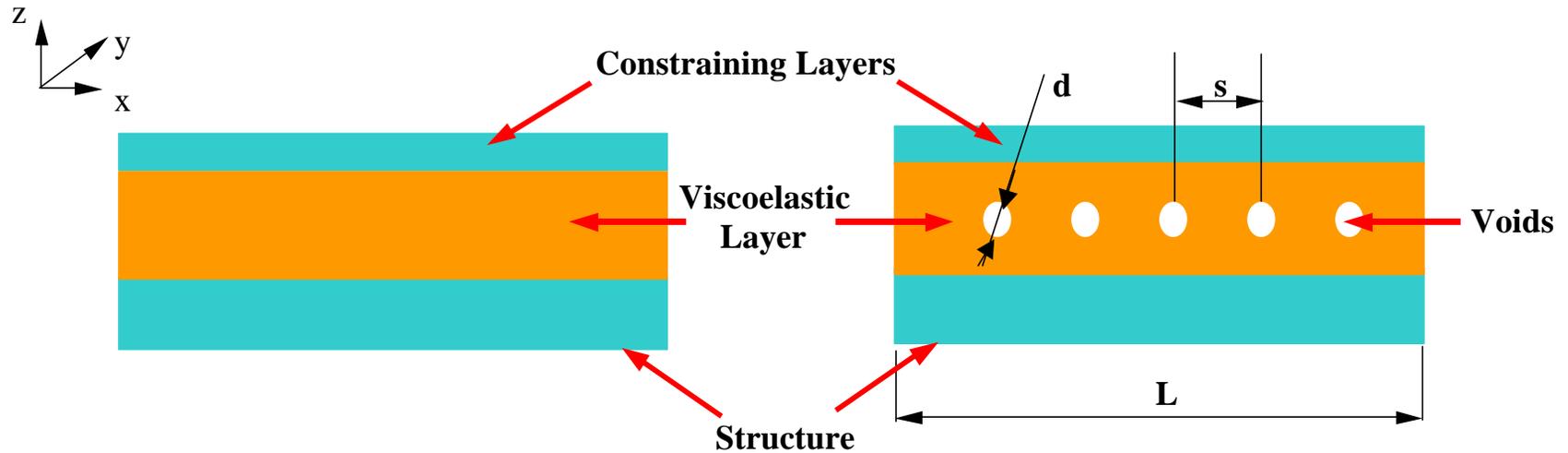
ACTIVE PIEZOELECTRIC DAMPING COMPOSITE



ENGINEERED DAMPING TREATMENTS

OBJECTIVE:

Enhance shear deformation by introducing optimally shaped perforations inside the damping treatment



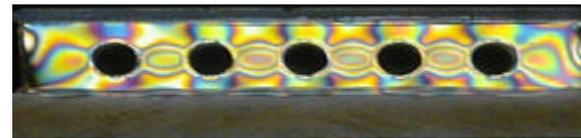
(a) – Conventional Damping Treatment

(b) – Perforated Damping Treatment

ENGINEERED DAMPING TREATMENTS (cont'd)

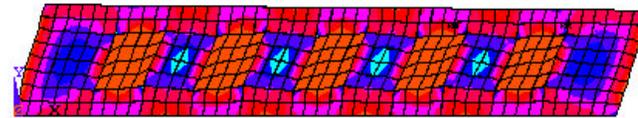
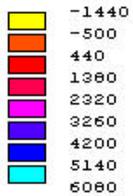


APPROACHES:



Photoelastic

Shear Stress (pa)



Finite Element

(a) – Conventional Damping Treatment

(b) – Perforated Damping Treatment

SHEAR STRESS DISTRIBUTION IN CONVENTIONAL DAMPING TREATMENT



ENGINEERED DAMPING TREATMENTS (cont'd)

Rapid Prototyping Machine (RPM)



- Design Optimal Perforations on CAD station
- Export CAD files to RPM
- Manufacture mold of damping Treatment
- Manufacture Damping Treatment
- Evaluate Performance of Engineered Damping treatment

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