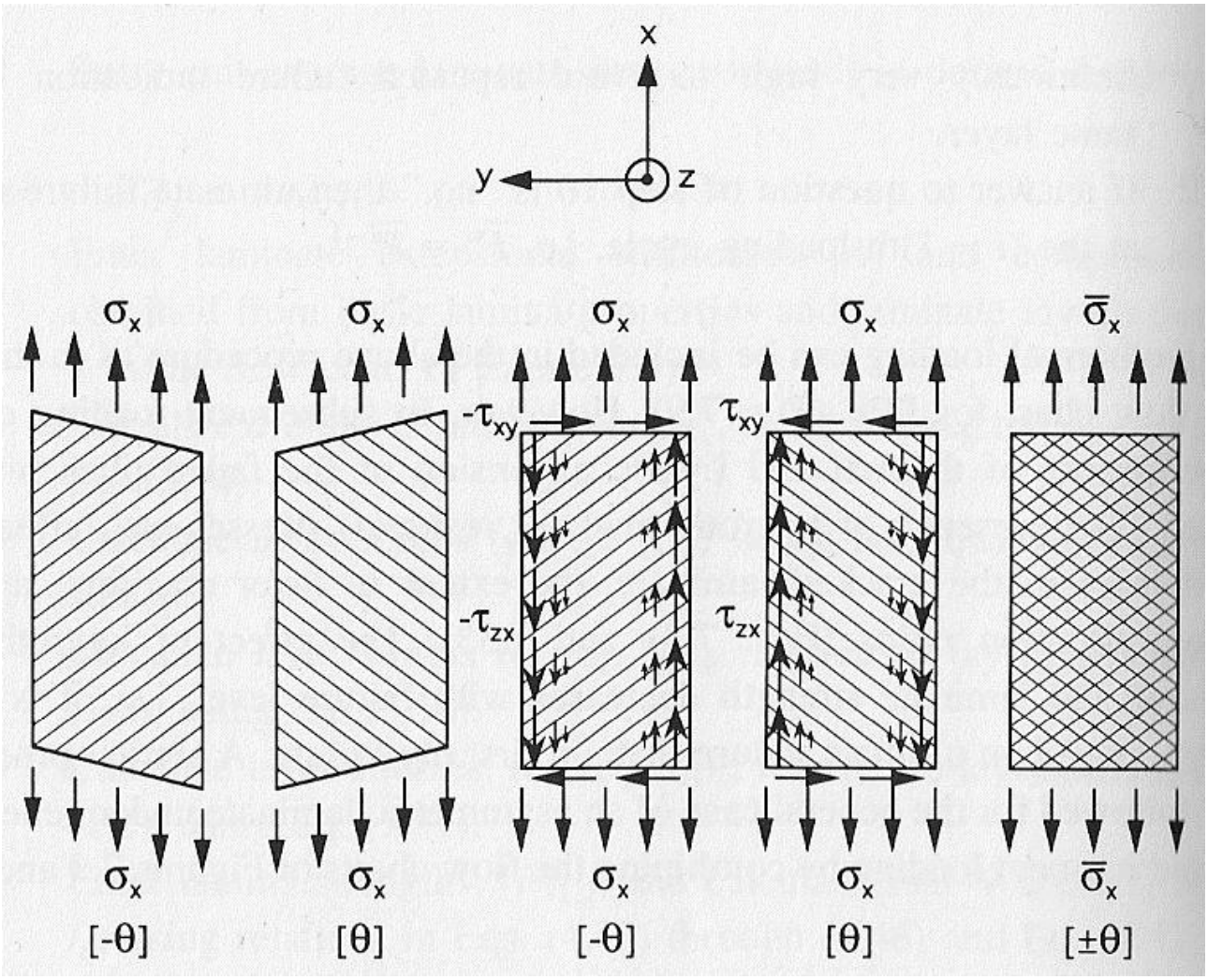
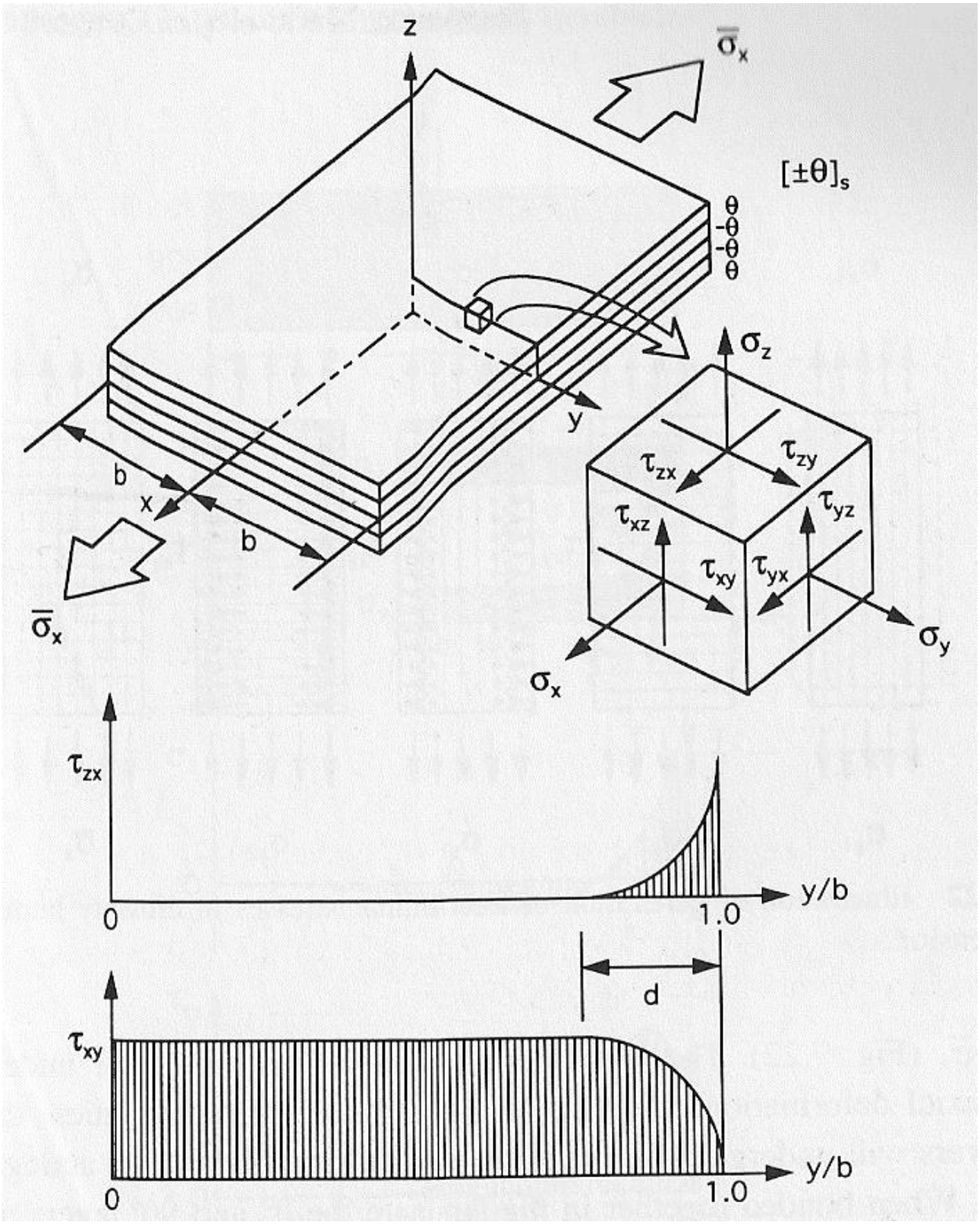
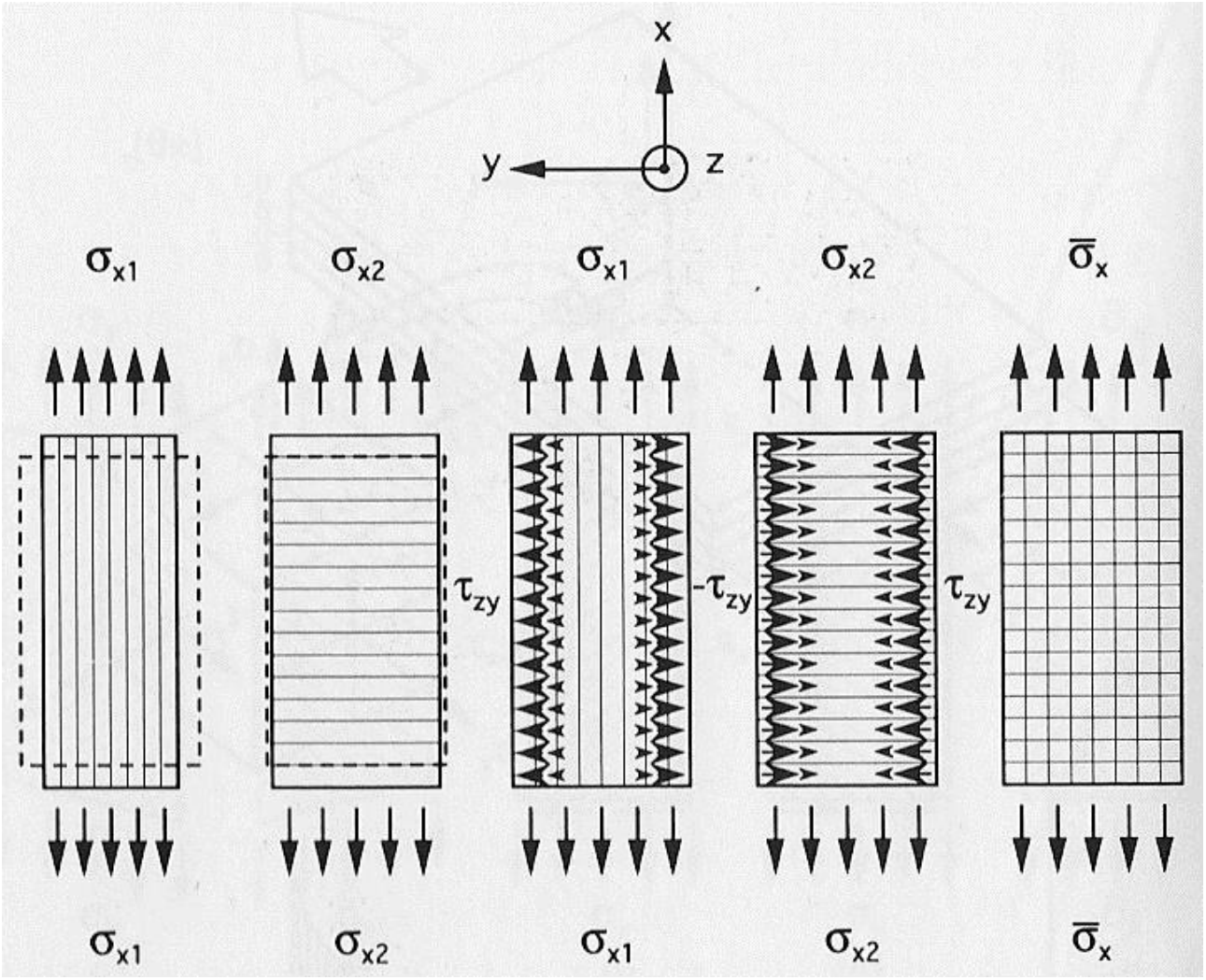
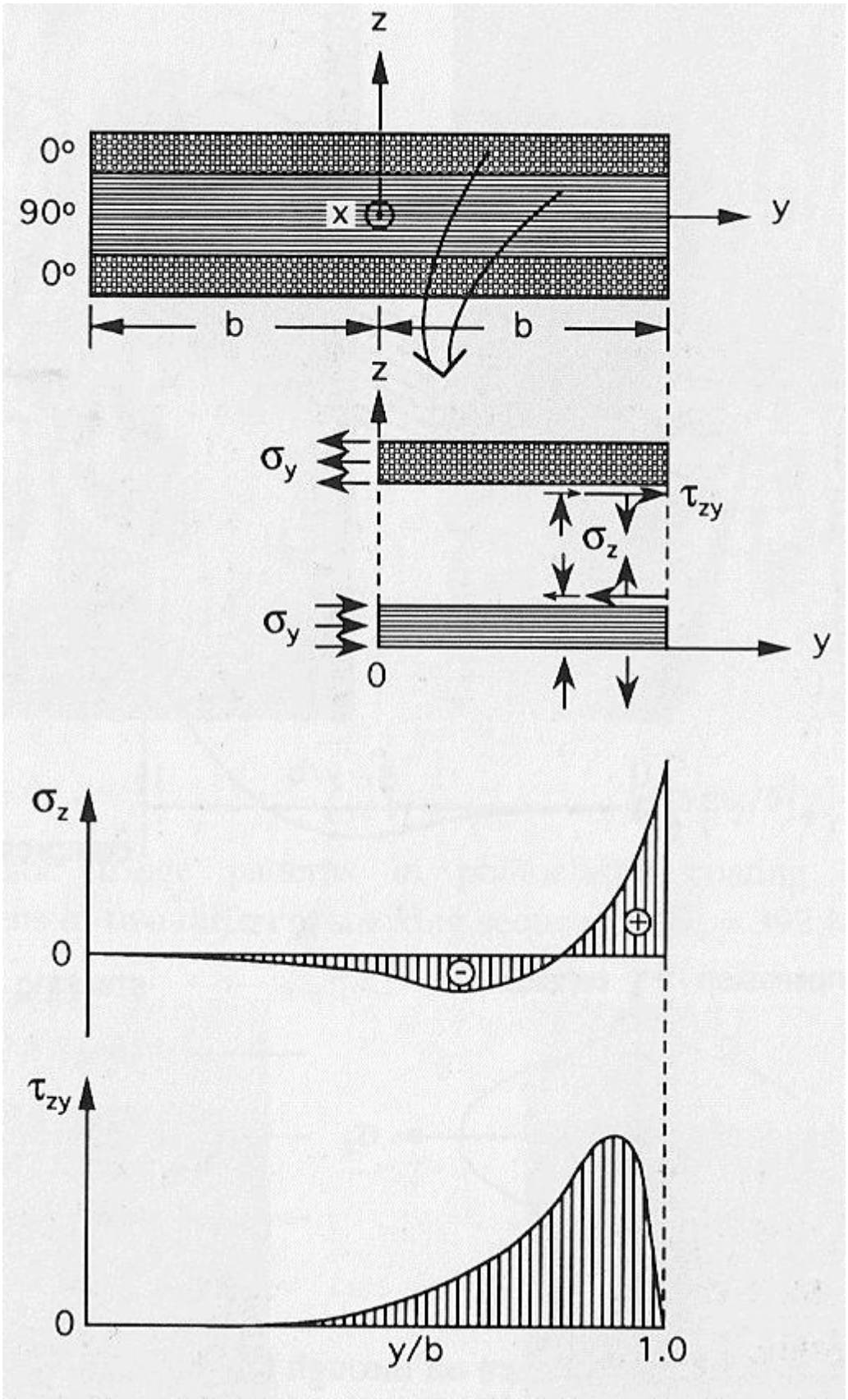

x
y
z
σx
σx
σx
σx
σ̄x
-τxy
τxy
-τzx
τzx
σx
σx
σx
σx
σ̄x
[-θ]
[θ]
[-θ]
[θ]
[±θ]


z
$\bar{\sigma}_x$
$[\pm\theta]_s$
θ
-θ
-θ
θ
y
b
x
b
$\bar{\sigma}_x$
σ_z
τ_{zx}
τ_{zy}
τ_{xz}
τ_{yz}
τ_{xy}
τ_{yx}
σ_y
σ_x
τ_{zx}
0
1.0
y/b
d
τ_{xy}
0
1.0
y/b


x
y
z
σ_{x1}
σ_{x2}
σ_{x1}
σ_{x2}
$\overline{\sigma}_x$
τ_{zy}
$-\tau_{zy}$
τ_{zy}
σ_{x1}
σ_{x2}
σ_{x1}
σ_{x2}
$\overline{\sigma}_x$


z
0°
90°
0°
x
y
b
b
z
σ_y
τ_{zy}
σ_z
σ_y
0
y
σ_z
0
τ_{zy}
0
y/b
1.0

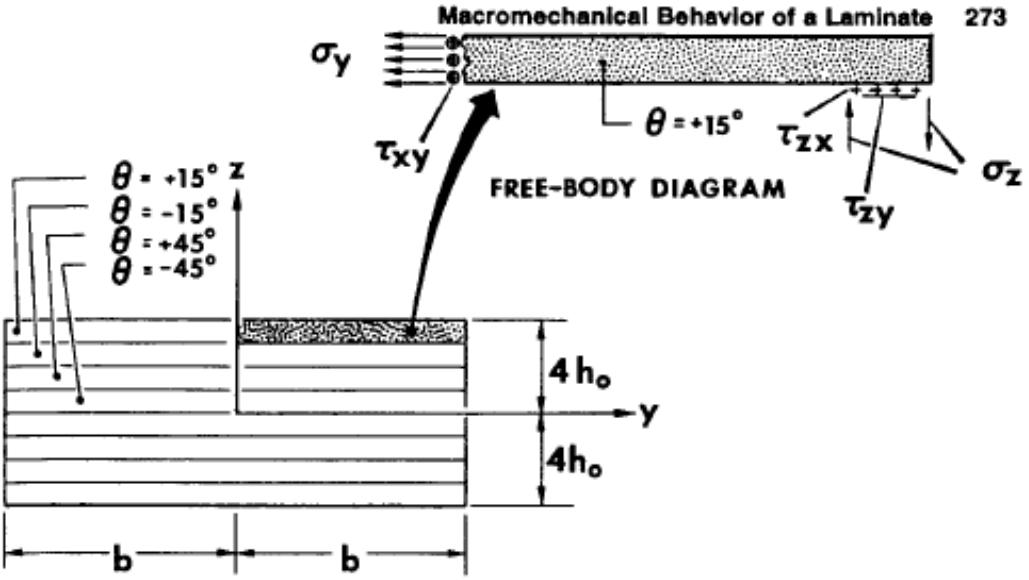


Figure 4-59 Mixed-Angle-Ply Laminate Free-Body Diagram *(After Pagano and Pipes [4-15])*

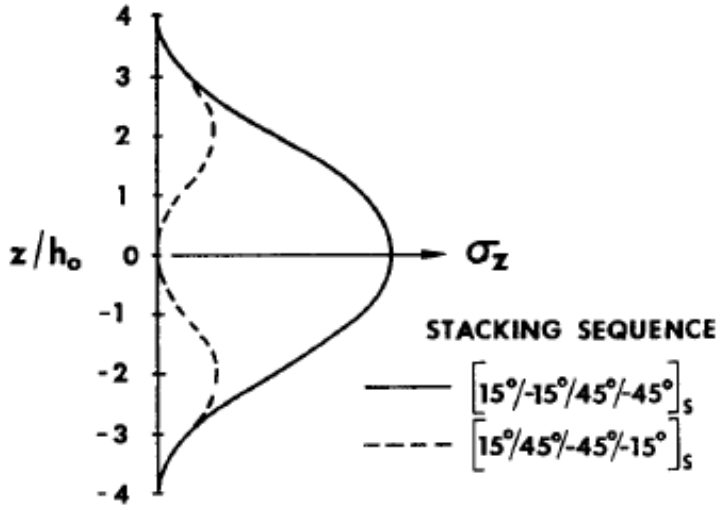


Figure 4-60 Distribution of Interlaminar Normal Stress in Boundary-Layer Region vs. z *(After Pagano and Pipes [4-15])*

In summary, three classes of interlaminar stress problems exist:

(1) $[\pm\theta]$ laminates exhibit only shear-extension coupling (no Poisson mismatch between layers), so τ_{xz} is the only nonzero interlaminar stress.
(2) [0°/90°] laminates exhibit only a Poisson mismatch between layers (no shear-extension coupling), so τ_{yz} and σ_z are the only nonzero interlaminar stresses.
(3) combinations of the above, for example, $[\pm\theta_1/\pm\theta_2]$ laminates, exhibit both shear-extension coupling and Poisson mismatch between layers, so have τ_{xz}, τ_{yz}, and σ_z interlaminar stresses.