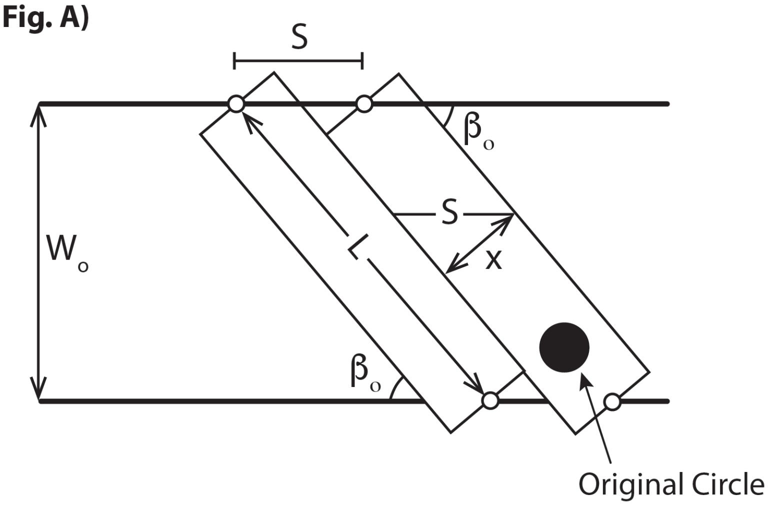
Original Geometry

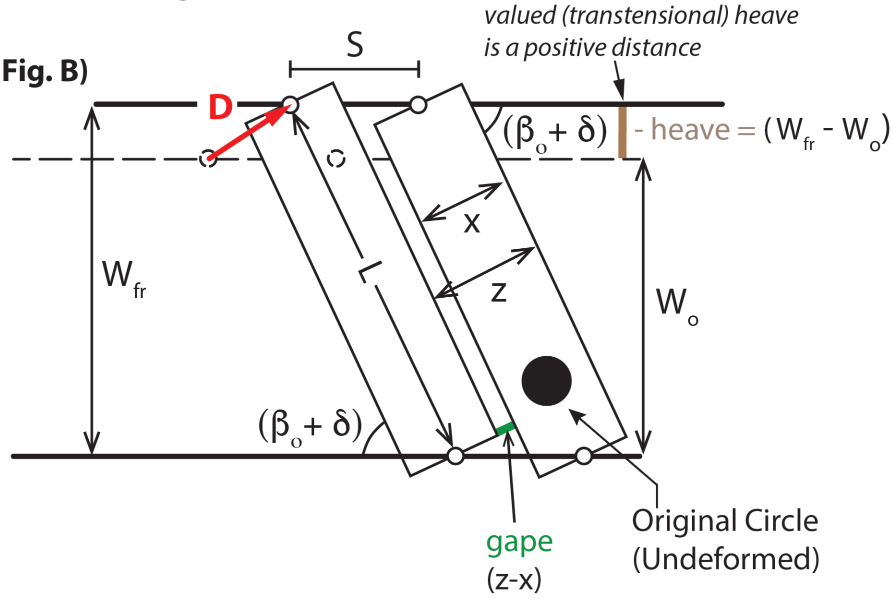
Fig. A)



Rotated Rigid Slats

Note: the negative of a negative-valued (transtensional) heave is a positive distance

Fig. B)



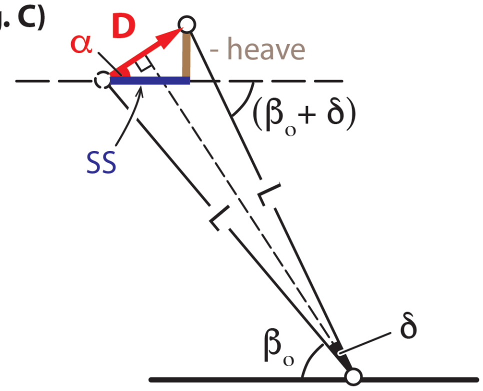
Definition of Variables

W_o	Original width of deformation zone
W_{fr}	Post-rotation width of deformation zone (rigid slat case)
W_{fd}	Final width of deformation zone (deformable slat case) =observed width in the field
L	Original length of slats
L^*	Final length of slats (deformable slat case)
S	Strike-parallel spacing of slats
x	Transverse width of slats (= original transverse spacing)
z	Transverse spacing of slats after deformation
β_o	Original strike angle of long dimension (axis) of slat
δ	Angular rotation of slat
$(\beta_o + \delta)$	Final strike angle of long dimension (axis) of slat
D	Displacement magnitude (rigid slat case)
α	Displacement angle (rigid slat case, positive if convergent)
D^*	Displacement magnitude (deformable slat case)
α^*	Displacement angle (deformable slat case)
SS	Strike-slip component of displacement (rigid slat case)
SS^*	Strike-slip component of displacement (deformable slat case)

Heave = $(W_o - W_{fr})$
= Zone width change (rigid slat case)

Heave* = $(W_o - W_{fd})$
= Zone width change (deformable slat case)

Fig. C)



Assumptions

1. Spacing (S) of slats is constant (i.e., no length changes parallel to strike of deformation zone)
2. Transverse width (x) of slats is constant
3. Volume of a slat is conserved (i.e., horizontal length stretch, L^*/L, is compensated by a vertical stretch, L/L^*)

Rigid Slat Model

(1) $L = W_o / \mathrm{SIN}(\beta_o)$	See Fig. A	
(2) $x = S \times \mathrm{SIN}(\beta_o)$	See Fig. A	
(3) $z = S \times \mathrm{SIN}(\beta_o + \delta)$	See Fig. B	
(4) $W_{fr} = L \times \mathrm{SIN}(\beta_o + \delta)$	See Fig. B	
(5) $W_{fr} = W_o \times [\mathrm{SIN}(\beta_o + \delta) / \mathrm{SIN}(\beta_o)]$	Substitute (1) into (4)	
(6) $W_{fr} / W_o = \mathrm{SIN}(\beta_o + \delta) / \mathrm{SIN}(\beta_o)$	Divide (5) by W_o	Stretch of the zone width
(7) $z / x = \mathrm{SIN}(\beta_o + \delta) / \mathrm{SIN}(\beta_o)$	Divide (3) by (2)	Bulk stretch transverse to the slats
(8) $(z - x) = S \times [\mathrm{SIN}(\beta_o + \delta) - \mathrm{SIN}(\beta_o)]$	Subtract (2) from (3)	Nominal gape between slats after deformation
(9) $(W_o - W_{fr}) = W_o \times [1 - [\mathrm{SIN}(\beta_o + \delta) / \mathrm{SIN}(\beta_o)]]$	Subtract (5) from W_o	**Heave** (positive if contractional)
(10) $\mathrm{SIN}(\delta/2) = (\mathbf{D} \times L) / 2$	See Fig. C	
(11) $\mathbf{D} = 2W_o \times \mathrm{SIN}(\delta/2) / \mathrm{SIN}(\beta_o)$	Combine (1) and (10)	
(12) $\delta = 2 \times \mathrm{ARCSIN}[\mathbf{D} \times \mathrm{SIN}(\beta_o)/2W_o]$	Rearrange (11)	
(13) $\alpha = \mathrm{ARCSIN}[(W_o - W_{fr}) / \mathbf{D}]$	See Fig. C	
(14) $\alpha = \mathrm{ARCSIN}[[\mathrm{SIN}(\beta_o + \delta) - \mathrm{SIN}(\beta_o)] / 2\mathrm{SIN}(\delta/2)]$	Insert (9) and (11) into (13)	
(15) $\mathbf{SS} = -1 \times \textbf{Heave} / \mathrm{TAN}(\alpha)$	See Fig. C, Eqn 9	

Deformable Slat Model—pure strike-slip case

(16) $L^* = W_o / \mathrm{SIN}(\beta_o + \delta)$	See Fig. E	
(17) $(L - L^*) = [W_o / \mathrm{SIN}(\beta_o)] - [W_o / \mathrm{SIN}(\beta_o + \delta)]$	Subract (16) from (1)	Axial shortening of slat
(18) $L^* / L = (1 + e_3) = \mathrm{SIN}(\beta_o)/\mathrm{SIN}(\beta_o + \delta)$	Divide (16) by (1)	Minimum principal stretch
(19) $(1 + e_2) = 1.0$	See assumption 2	Intermediate principal stretch
(20) $(1 + e_1) = \mathrm{SIN}(\beta_o + \delta) / \mathrm{SIN}(\beta_o)$	See assumption 3	Maximum principal stretch (vertical)
(21) $(\beta_o + \delta)$	See Fig. E	Angle of strike-perpendicular line from X direction of strain
(22) Stretch of strike-perpendicular line: $= 1/[\{\mathrm{SIN}((\beta_o + \delta)/ \mathrm{SIN}(\beta_o)\}^2 \times \mathrm{SIN}^2(\beta_o + \delta) + \mathrm{COS}^2(\beta_o + \delta)]^{-1/2}$		From Ramsay and Huber (1983), p. xx.
(23) $\mathbf{SS}^* = \mathbf{D}\ \mathrm{COS}\ \alpha + [\mathrm{TAN}\{90 - (\beta_o + \delta)\} \times (-1) \times \textbf{Heave}]$		See Figs. D & E (insert Eqns 9, 11, 13)