Figure A2 shows the variation of the angles ξ and ψ across the interface between a competent (subscript c) and incompetent (subscript i) layer with effective viscosity contrast η_c/η_i. Note that large viscosity contrasts (i.e. $\eta_c/\eta_i > 100$) imply that the soft bed will always have angles $\xi_i \approx \psi_i \approx 45°$, irrespective of the orientation of ξ_c and ψ_c in the competent bed, provided that $0° > \xi_c > 90°$.

A.5. *Inclination angles of stress and strain-rate axes in individual laminae related to bulk angles for multilayers*

The angles ξ_a and ψ_a of inclination of the principal stress and strain-rate axes within any individual layer $a(=1, \ldots, q)$, respectively,

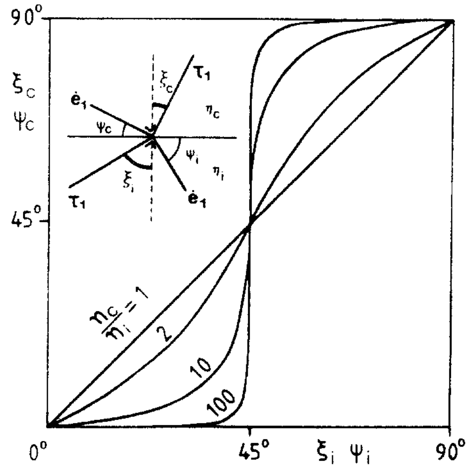

Fig. A2. The refraction of the principal axes of the ellipsoids of stress and strain-rate across an interface separating a competent (c) and incompetent (i) layer quantified in terms of the angles ξ and ψ. Plotted in the diagram are curves for various viscosity contrasts η_c/η_i between the competent and incompetent beds. See also Section A.4 and Fig. A1. (After Treagus 1973, fig. 3.)

are also related to those of the bulk stress and strain-rates (i.e. ξ and ψ) in a very simple fashion. Substitution of expression (25) into (A26) and (A31) gives, respectively:

$$\cot 2\xi_a/\cot 2\xi = \eta_a/\eta_N \qquad \text{(A35)}$$

$$\cot 2\psi_a/\cot 2\psi = \eta_a/\eta_N. \qquad \text{(A36)}$$

Substitution of equation (27) into (A27) and (A32) yields, respectively:

$$\cot 2\xi_a/\cot 2\psi = \eta_a/\eta_S \qquad \text{(A37)}$$

$$\cot 2\psi_a/\cot 2\psi = \eta_a/\eta_S. \qquad \text{(A38)}$$

Note that the validity of expression (29) can be confirmed independently by dividing either expression (A35) by (A37) or (A36) by (A38). Rule (A28) can also be obtained by using expressions (A35) or (A37), and rule (A33) follows from expression (A36) or (A38).

Combining expressions (A35) and (A38) yields:

$$\cot 2\psi_a/\cot 2\xi_a = (\cot 2\psi/\cot 2\xi)\delta. \qquad \text{(A39)}$$

The principal axes of stress and strain-rate will be parallel within the individual laminae of isotropic viscosity, so that $\cot 2\psi_a/\cot 2\xi_a = 1$. Insertion of this boundary condition in expression (A39) gives:

$$\tan 2\psi/\tan 2\xi = \delta. \qquad \text{(A40)}$$

which is similar to expression (29). Reflection on these results reveals that knowledge of only one of the angles ξ_a, ξ, ψ_a, ψ and of the intrinsic material properties δ, η_N, η_S and η_a is sufficient to solve for the other three angles.

CORRIGENDA

Two minor printing errors occurred in expressions (10) and (A8) of the companion paper (Weijermars 1991). In expression (10), the tensor element F_{13} misses the left-hand bracket and should read $(2\dot{e}_{xz}/\dot{e}_{xx})\sinh(\dot{e}_{xx}t)$. In expression (A8), tensor element F_{22} should read 1 and not 0.