Welt, transpression (or oblique convergence) is a common tectonic setting at plate boundaries characterized by two components of relative plate velocity:

- one component is perpendicular to the plate boundary (shortening component)
- one component is parallel to the plate boundary (strike-slip component)

A good example for oblique convergence is found in the Middle East, where the Arabian plate converges obliquely towards the Eurasian plate with an angle of about 35° with respect to the plate boundary in the Zagros Mountains.

- Oblique convergent plate boundaries may be characterized by...
  - homogeneously distributed strain (a.s., true transpression),
  - full strain partitioning resulting in areas exhibiting shortening structures (thrust, folds) bounded by areas exhibiting simple-shear structures (strike-slip faults),
  - any mixture between the two end-member cases above.

Interesting! Sounds like transpression is really a true 3D problem, right? And you modeled that?

But even more interesting is the orientation of the folds!

During all simulations, the orientation of the fold axes of all sequential folds and it turns out that they are always oriented parallel to the major horizontal principal strain axis ($\lambda_{\text{max}}$). They initiate in this orientation and then rotate together with $\lambda_{\text{max}}$. And that's independent of the convergence angle, the applied strain, and most importantly of the viscosity ratio between the two layers. Isn't that amazing?

Indeed! And this also means that the fold axis is NOT a material line, because $\lambda_{\text{max}}$ is not a material line. Instead, hinge migration must take place.

If so, I understand correctly, there should be some kind of triangular relationship between the convergence angle, the amount of strain, and the fold axis orientation. If you knew two, you could determine the third. And all of this independent of the viscosity ratio. That's indeed pretty cool!

Well, now I don't have the time anymore to prepare one because you asked so many questions. I guess, I will just print this chat feed.

But you can download my paper if you like. And I give you some references if you are interested in further details:


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