

Method for reconstructing an original dike orientation from pole to the dike and using paleomagnetic techniques for determining the original and current magnetic vectors for the dike. This is a specific case of determining a rotation vector and magnitude of rotation given two initial vectors and two final vectors.

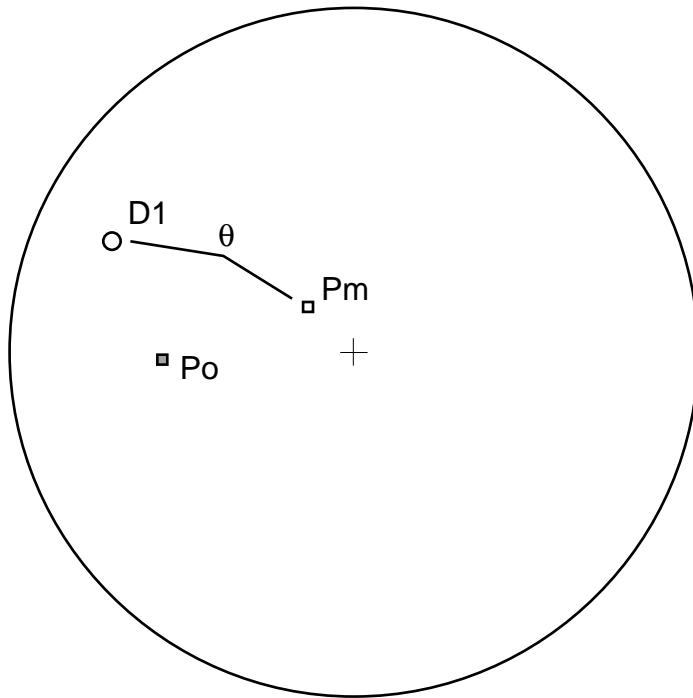
Example Givens:

P_m = measured dike paleomagnetic direction

P_o = known original paleomagnetic direction

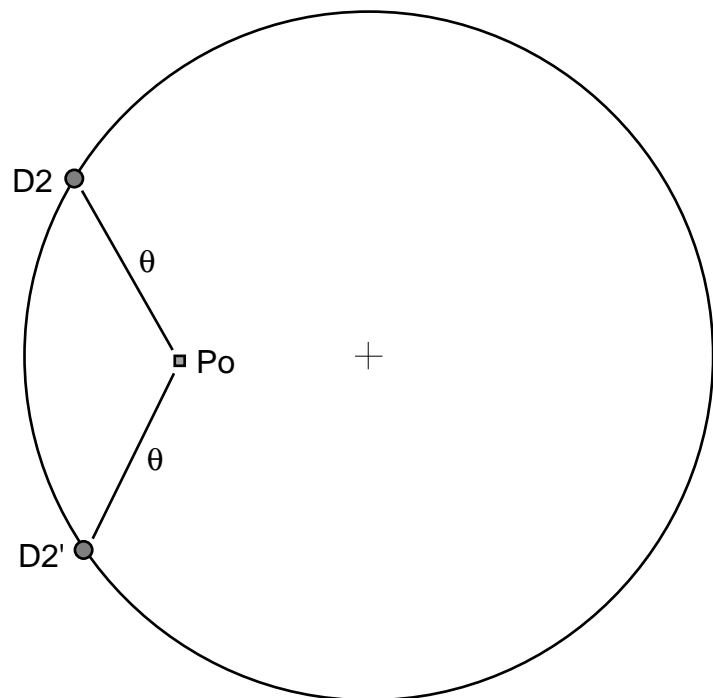
D_1 = measured pole to dike

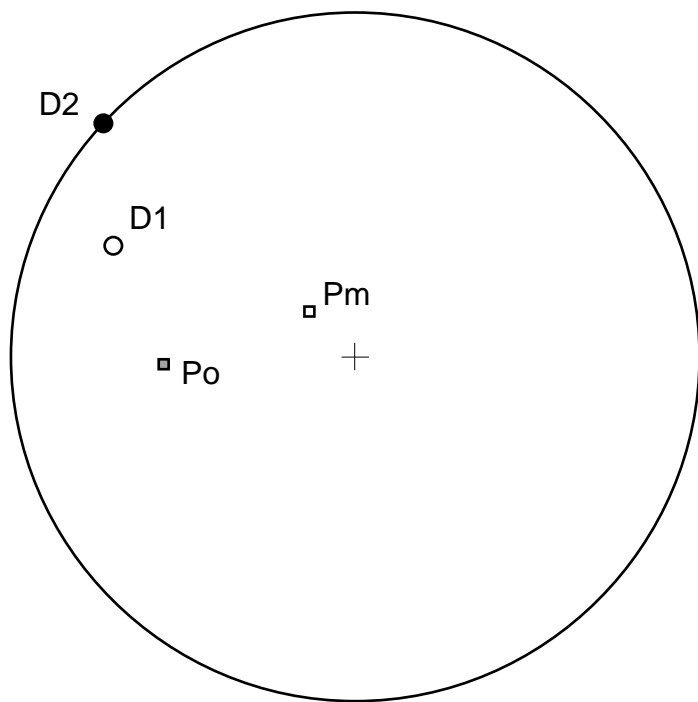
θ = angle between measured directions



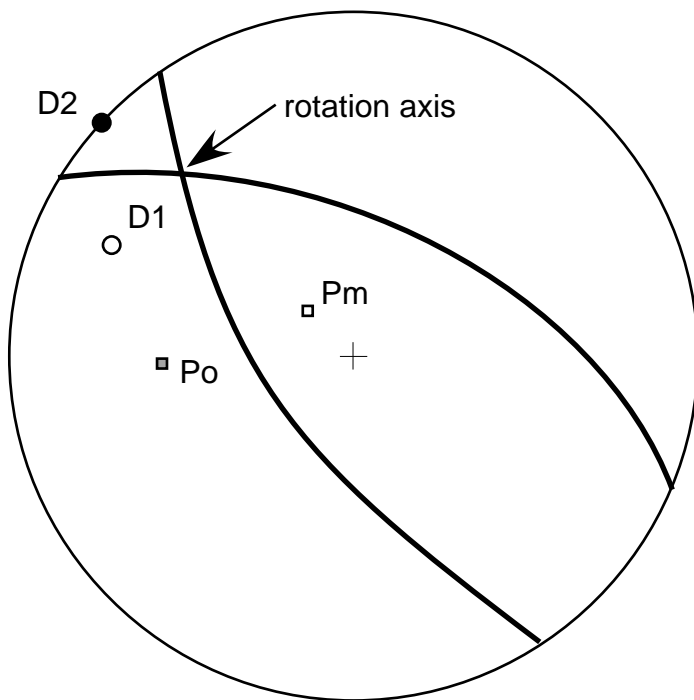
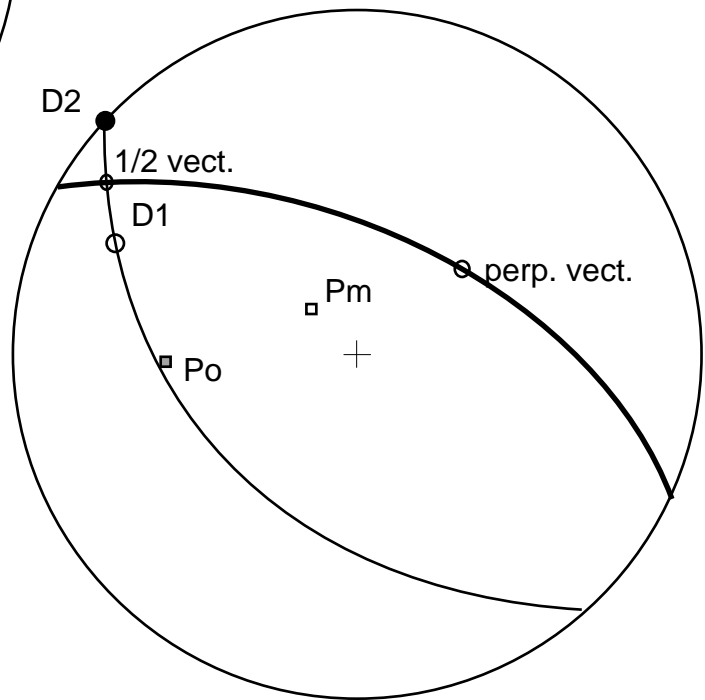
We assume that dikes intrude vertically, therefore the dike pole must plot on the primitive angle away from the original paleomagnetic direction. For this example, that results in two possible dike orientations.

There are other possibilities - what are they? What would you do should they occur in a real problem?





Now using only one of the possible poles, the the axis of rotation that moves D1 to D2 must lie in the plane that is angularly equidistant from both. The plane can be defined by any two vectors in the plane. We know one is just the vector that is halfway between D1 and D2. Another vector is the pole to the plane (great circle) that contains D1 and D2.



Just repeat the same method to get the plane bisecting the paleomagnetic poles Pm and Po.

Then the intersection of the two bisecting planes is the unique(?) axis of rotation that rotates the dike to vertical and the measured paleomagnetic to the original one.

Repeat process for the axis of rotation for the other possible original dike attitude.