962-35-1025 **Jean E Taylor*** (taylor@math.rutgers.edu), Mathematics Dept, Rutgers University, 110 Frelinghuysen Road, Piscataway, NJ 08854. *Crystals that rotate as they shrink.* Preliminary report.

Assume there is a crystal B embedded in another crystal A in a two-dimensional plane (or as a cylinder in a 3-dimensional slab), with A and B composed of the same material but with misorientation θ of B to A. Based on the experiments of Li, Parker and Washburn as interpreted by the materials scientist John Cahn, we assume that grain growth in the normal direction for A produces in B a tangential shear (depending on and affecting θ) as well as shrinking. A variational model related to that of Almgren, Taylor and Wang for motion by weighted mean curvature is proposed to determine the growth of A and the concurrent shrinking and rotating of grain B, under motion driven by reduction of total surface free energy. Surface diffusion is used to allow for shape changes; new techniques are devised in order to include this surface diffusion in a growth model that is not volume conserving. Slippage can also be incorporated into this variational model. Such grain rotation for grains of small misorientation θ has been seen in 3-d atomic simulations. (Received October 01, 2000)