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Torque dependence of the voltage-induced torsional strain in tantalum trisulfide associated with charge-density-wave depinning[1] J. NICHOLS, H. ZHANG, J.W. BRILL, University of Kentucky — Crystals of orthorhombic tantalum trisulfide slowly twist (by $\sim 1/4$ degree) when voltages near the charge-density-wave depinning threshold are applied. We have studied how this hysteretic voltage-induced torsional strain (VITS) is affected by additional torques applied to the sample by attaching a magnetized steel wire to the center of the sample. The torsional strain in the crystal was measured by placing the sample in an RF cavity in a small, variable magnetic field. We have found that twisting the sample by a few degrees can have large effects on the induced strain: i) twisting can change the magnitude and dynamics of the VITS; ii) in some cases, twisting can change the direction of the VITS. The latter effect suggests that the VITS is caused by dislocation lines in the crystal causing transverse gradients in the CDW phase. As these gradients compress and dilate with alternating applied voltage, they can cause torsional strains in the crystal. A puzzle, however, is what causes the voltage-induced torsional strain to be so slow (time constants ~ 1 sec near the depinning threshold).

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