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The Gordon-Litherland pairing for knots in thickened surfaces

We introduce the Gordon-Litherland (GL) pairing for knots and links in thickened surfaces that bound unoriented spanning surfaces. Using the GL pairing, we define several invariants (signature, determinant, and nullity) and discuss how to compute them from the Tait graph and Goeritz matrix associated to a checkerboard surface. The invariants depend very weakly on the choice of spanning surface, and in fact only on its S^*-equivalence class.

We will discuss several applications to problems such as detecting the minimal supporting genus, determining sliceness, and slice genus of virtual knots. The GL pairing can also be regarded as the relative intersection pairing on a 4-manifold obtained as the 2-fold cover along the surface. This talk represents joint work in progress with M. Chrisman and H. Karimi.