The sheet numbers of 2-knots

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Abstract. A 2-knot is an embedded 2-sphere in 4-space, and its diagram is a projection image of the 2-knot into 3-space together with crossing information. Such a diagram is regarded as a disjoint union of compact connected surfaces each of which is called a sheet. The sheet number of a 2-knot is defined as the minimal number of sheets for all possible diagrams of the 2-knot. The notion of the sheet number is analogous to the crossing number of a classical knot in 3-space. In this talk, we give a lower bound of the sheet number in several ways (Fox colorings, fundamental quandles, and cocycle invariants), and determine the sheet numbers of the 2-, 3-twist- spun trefoils, and some ribbon 2-knots.