962-52-873 **sarah-marie belcastro** (smbelcas@math.uni.edu), Department of Mathematics, 330 Wright Hall, University of Northern Iowa, Cedar Falls, IA 50614-0506, and **Thomas C Hull*** (thull@merrimack.edu), Department of Mathematics, Merrimack College, North Andover, MA 01845. *Modelling the folding of paper into three dimensions.*

We model the folding of ordinary paper via piecewise isometries $\mathbb{R}^2 \to \mathbb{R}^3$. The collection of crease lines and vertices in the unfolded paper is called the crease pattern; we mainly consider the case of crease patterns with a single vertex. Our results generalize the previously known necessity conditions from the more restrictive case of folding paper flat (into $\mathbb{R}^2$); if the crease pattern is foldable, then the product (in a nonintuitive order!) of the associated rotational matrices is the identity matrix. This condition holds locally in a multiple vertex crease pattern and can be adapted to a global condition. Sufficiency conditions are significantly harder, and are not known except in the two-dimensional single-vertex case. We have achieved partial results in this arena. (Received September 28, 2000)