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**A NEW TECHNIQUE FOR SELECTING THE VERTICES FOR A TIN,
AND A COMPARISON OF TINs AND DEMs OVER A VARIETY OF SURFACES**

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ABSTRACT

A technique is presented for selecting the vertices for a Triangulated Irregular Network (TIN) from digitized contour lines and selected elevation points. The procedure relies on a Douglas-Peucker generalization of the contour lines to capture a large set of points along ridges and channels. This set is supplemented by elevation values at peaks and pits, along edges and at corners of the model, and at other locations necessary to improve the overall fit of the TIN. The procedures for identifying the supplementary points are described in detail.

In addition, a comparison is presented between contour-based TINs and conventional, gridded DEMs for 11 study areas from around the United States, including one from each of the major physical divisions described by Fenneman. TINs are created for each study area that require the same amount of disk space as the corresponding DEMs, by limiting the number of vertices to approximately one-tenth the number of elevation values in the DEMs. The two structures are compared by determining how well they estimate the elevations at over one thousand test points, and by visual inspection of perspective block diagrams and shaded relief maps. The contour-based TINs yield superior images and consistently lower root mean square errors.