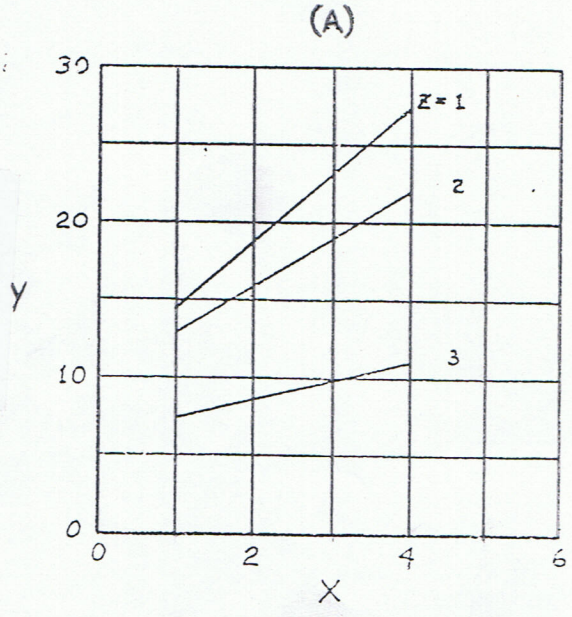
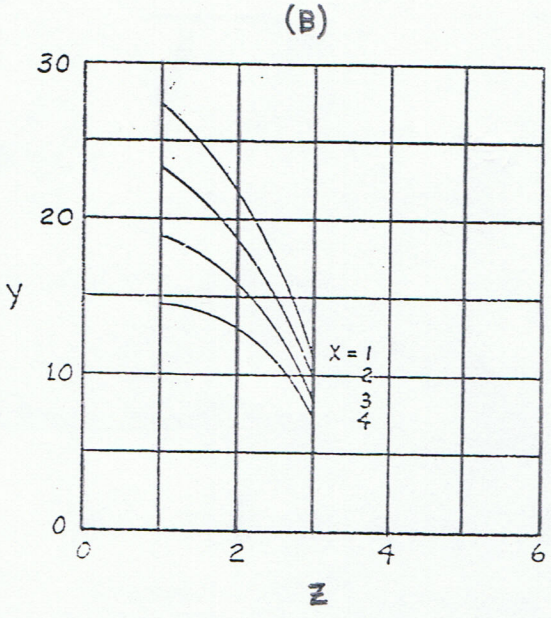
CARPET PLOTS

Carpet plotting is a method of presenting a function of two independent variables such that the interpolation in either independent variable is greatly facilitated. The principal advantage of carpet plotting over other methods of presentation lies in the ease with which interpolation and extrapolation can be accomplished while retaining the influence of both independent variables. Other advantages of carpet plotting are:

- Eliminates cross-plots for intermediate values
- Simplifies extrapolation beyond the bounds of data
- Ease of spotting data errors
- Ease of indicating constraints or bounds in the data
- Ease of superimposing other related parameter lines on the carpet.

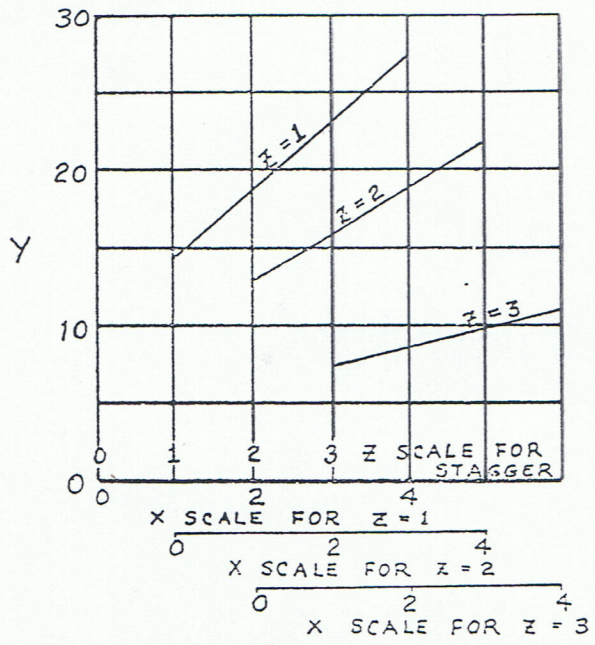
The equation x=yz can be plotted in several ways. A curve of y against x for each value of z can be plotted as shown in figure (A). Another way is to plot the value of y against z for a constant value of x as in (B). Both graphs contain all the valuable information, but interpolation between values is not very accurate. The representation of this data can be further clarified if the results of (A) and (B) are replotted in the form of a carpet plot. Interpolation then becomes both simple and accurate.



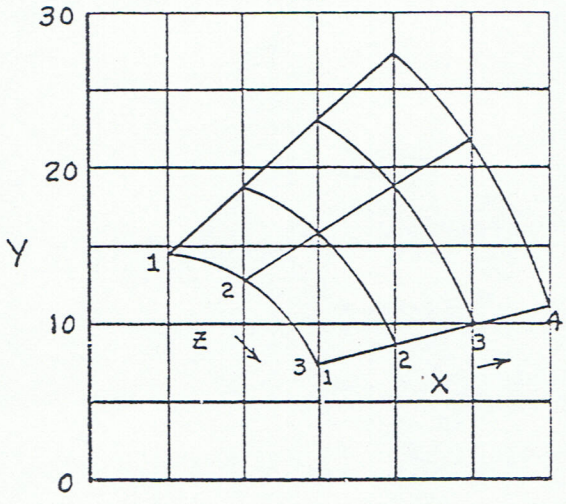


The conventional carpet plot is constructed by first plotting sucessive curves of one family on a staggered scale. The y-versus-x values of (C) are staggered by a distance horizontally proportional to the constant z for which the plot is drawn. (Note "z scale for stagger".) Judgment must be exercised when selecting the direction of the scales in order to open up the family of curves rather than close or overlap them. The carpet is completed (D) by drawing criss-cross curves of constant x values between the staggered curves. When this is done and the lines properly labelled, the horizontal x scales are no longer required.

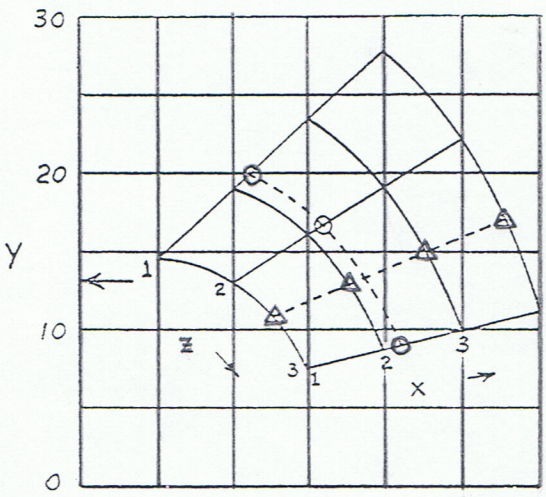
(C)



(D)



(E)



Knowledge of how to construct a carpet is not a prerequisite for knowing how to read and interpolate one. One characteristic of carpet plots is that curves intersect on a common vertical line. To interpolate, appropriately divide the distance between vertical intersections, and project the points to the curve. Figure (E) illustrates the cross-plots necessary to read a y value when x=2.2 and z=2.5. The dashed curve is drawn for z=2.5 merely by joining up points (△) corresponding to their value on each of the curves drawn for constant x. Similarly, a curve for an intermediate value of x=2.2 is drawn by joining corresponding points (⊙) on the curves drawn for constant z. The two curves intersect at y=13.