10.4 COVARIANCE MODELING

Figure 10.1 Profile Plots for the Cattle Data Treatments Groups A (top panel) and B (lower panel). The thicker line indicates the overall mean profile for this group. Reprinted with permission from Zimmerman, D.L. and Núñez-Antón, V. (2010) Antedependence Models for Longitudinal Data. Boca Raton, FL: Chapman & Hall/CRC

The PRISM is a two-dimensional array of certain partial regression plots. More specifically, it is the graphical equivalent of a matrix of certain partial correlations, where the plot in row \( j \) and column \( k \) \((j \geq k)\) of the array is the partial regression plot of standardized response (or residual) variables at times \( k \) and \((j + 1)\), adjusted for all standardized responses (or residuals) at intervening times \( k + 1, \ldots, j \). Random scatter in the \((j, k)\)th plot indicates that the responses (or residuals) at times \( k \) and \((j + 1)\) are conditionally independent, given the intervening responses (or residuals), whereas departures from random scatter indicate conditional dependence. A layout of the PRISM is shown in Figure 10.2. As will be illustrated in later sections (see, e.g., Section
are not assumed to decrease in an exponential way but, instead, they are assumed to vary in an unstructured manner (i.e., no specific model or parameterization is imposed on them). However, these models maintain the somewhat restrictive stationarity assumption for correlations. To illustrate, if $n = 4$, the covariance structures for the TOEP and TOEPH models are, respectively:

\[
\sigma^2 = \begin{pmatrix}
1 & \rho_1 & \rho_2 & \rho_3 \\
1 & 1 & \rho_1 & \rho_2 \\
1 & 1 & 1 & \rho_1 \\
1 & 1 & 1 & 1
\end{pmatrix}
\]