Abstract: Among all finite difference schemes for solving the advection portion of the dispersion equation, the Holly-Preissmann's two-point method (H-P method) introduces the least numerical damping and phase errors. The key of this method is the use of a cubic interpolating polynomial for searching the characteristic trajectory on the spatial axis. This polynomial is constructed with the use of parameters including dependent variables and its space derivatives for two grid points on the spatial axis. In this article, following a similar idea, a new interpolation technique was constructed, which uses the dependent variables and its temporal derivatives for two points on the time axis as the parameters for the polynomial. Through the error analyses performed on the numerical damping and phase errors for the linear advection equation, it has been observed that this new technique gives a more accurate solution than the H-P method. A simple hypothetical model was constructed to demonstrate the merits of the new technique. For the pure advection and advection-diffusion problems, based on the simulations demonstrated, the newly-proposed temporal interpolation technique gives better results when the Courant number Cr is less than 1.0. (13 refs.)