Compact Finite Differences and Cubic Splines

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Recently an unexpected connection was found between compact finite differences and cubic splines, which has led to a new and possibly useful way of dealing with the edge conditions (typically dealt with by using the not-a-knot condition). In exploring this connection, we prove that a certain family of parameterized tridiagonal matrices is totally positive, which means that the computation of cubic splines and compact finite differences can be done in a fast and numerically stable way. This talk is intended to be widely accessible, but the audience will have to believe that cubic splines, such an elementary topic, might still be interesting!