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Derek Bruff (derek.bruff@vanderbilt.edu), Dept of Mathematics and Center for Teaching, Vanderbilt University, Nashville, TN 37235, **Jeffrey Geronimo** (geronimo@math.gatech.edu), School of Mathematics, Georgia Institute of Technology, Atlanta, GA 30332-0160, and **Doug Hardin*** (doug.hardin@vanderbilt.edu), SC1326 Department of Mathematics, Vanderbilt University, Nashville, TN 37240. *Orthogonal wavelets centered on an arbitrary knot sequence.*

We develop a general notion of orthogonal non-uniform *wavelets centered on a knot sequence*. As an application, we construct piecewise polynomial multiwavelets for a knot sequence obtained from $z(\tau) = \{a + b\tau \mid a, b \in \mathbf{Z}\}$ where $\tau = \frac{1}{2}(1 + \sqrt{5})$ is the golden mean. These multiwavelets have a scaling factor τ and are called τ -multiwavelets. τ -Haar wavelets were constructed by Patera and Gazeau (1996) and were the first wavelets constructed with an irrational scaling factor. While τ -Haar wavelets are orthogonal and compactly supported they are not continuous. Here we present examples of C^0 and C^1 piecewise polynomial orthogonal τ -multiwavelets. (Received September 26, 2006)