1012-46-185   **Troy L. Henderson*** (`troy.henderson@usma.edu`), Department of Mathematical Sciences, United States Military Academy, West Point, NY 10996, and **David R. Larson** (`larson@math.tamu.edu`), Department of Mathematics, Texas A&M University, College Station, TX 77845. *Causality and Frame Theory.* Preliminary report.

The notion of causality leads to a natural equivalence relation on frame sequences that seems to be new in the literature. The relation that is established between a Riesz basis and the orthonormal basis derived from it by the Gram-Schmidt procedure is causal in the sense that the k'th element of the orthonormal basis is a linear combination of only the first k elements of the Riesz basis. It is not hard to show that every frame sequence is causally related in this sense to a Parseval frame, and if the frame is not a Riesz basis there are uncountably many such Parseval frames. Causal relationship under very mild restriction is an equivalence relation. The fact that there are many causually equivalent yet non-unitarily equivalent Parseval frames shows that the theory is rich. For a given frame we consider best Parseval approximants within its causal equivalence class. This yields more than one natural causal Gram-Schmidt procedure for coverting a frame to a Parseval frame. (Received September 19, 2005)