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Orthogonal and non-orthogonal fusion frame theory will be discussed. Formulations of high resolution image fusion using fusion frames will be presented. These techniques use the impulse response function of cameras as the building block of the mathematical frames and fusion frames in the fusion process. By taking realistic camera physics into consideration, the proposed approach provides a natural and realistic modeling of the high-resolution image fusion problem. Deterministic and iterative fusion algorithms will be discussed. The fusion frame approach for high-resolution image fusion is also seen to be robust to realistic fusion problems from inhomogeneous image measurements (taken at different space or time or by different cameras). The effectiveness of this approach is demonstrated through both simulated and realistic examples. This is a joint work with Zhenjie Yao and Weidong Yi. (Received August 10, 2010)