1033-42-65 **Christopher Heil*** (heil@math.gatech.edu), School of Mathematics, Georgia Tech, Atlanta, GA 30332-0160, and **Gitta Kutyniok** (kutyniok@math.princeton.edu), Program in Applied Mathematics, Princeton University, Princeton, NJ 08544. *The Homogeneous Approximation Property for Wavelet Frames.*

Irregular wavelet frames are poorly understood, yet they arise very naturally, e.g., from sampling theory or the inevitability of perturbations. We prove that irregular wavelet frames satisfy a Homogeneous Approximation Property, which essentially states that the rate of approximation of a wavelet frame expansion of a function f is invariant under time-scale shifts of f, even though Λ is not required to have any structure—it is only required that the wavelet ψ have a modest amount of time-scale concentration. It is shown that the Homogeneous Approximation Property has several implications on the geometry of Λ, and in particular a relationship between the affine Beurling density of the frame and the affine Beurling density of any other Riesz basis of wavelets is derived. This further yields necessary conditions for the existence of wavelet frames, and insight into the fundamental question of why there is no Nyquist density phenomenon for wavelet frames, as there is for Gabor frames that are generated from time-frequency shifts. (Received August 30, 2007)