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On the type of convergence in atomic representations

The type of convergence in atomic representations in Besov and Triebel–Lizorkin spaces is usually presented in the sense of the topology of the tempered distributions, occasionally with some remarks about the possibility of the convergence being valid in some Lebesgue spaces, if some conditions are met. Here we show that, apart from borderline situations, those representations indeed converge in the Besov or Triebel–Lizorkin spaces themselves. We also deal with a corresponding question for wavelet representations in a recently introduced class of generalized local Hardy spaces.