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*Convolution inequalities in locally compact abelian groups and Navier-Stokes equations.*

We establish a (sharp) criterion for certain generalized Young type convolution inequalities to hold in a locally compact abelian group  $G$ . We then specialize to the case when  $G$  is  $\mathbb{Z}^n \times \mathbb{R}^m$  and illustrate how these inequalities can be employed to establish analyticity results for a variety of evolution equations. In particular, we show how our method, which is inspired by that of Grujic and Kukavica, can be used to treat the Navier-Stokes equations with periodic boundary condition in a subset of the variables and with initial data in certain Besov spaces. As special cases, we recover the Gevrey regularity results of Foias and Temam, LeJan and Sznitman, and Lemarie-Rieusset among others. We also establish analyticity and obtain estimates for the space analyticity radius of the Koch-Tataru solution in the space  $BMO^{-1}$ . (Received December 18, 2007)