A STEINBERG TYPE DECOMPOSITION THEOREM FOR HIGHER LEVEL DEMAZURE MODULES

We study the $\mathfrak{g}$–stable Demazure modules of a level ℓ–integrable highest weight module for the affine algebra $\hat{\mathfrak{g}}$ associated to the simple Lie algebra $\mathfrak{g}$. These modules are indexed by pairs $(\ell, \lambda) \in P^+ \times \mathbb{N}$ where P^+ is the set of dominant integral weights of $\mathfrak{g}$. Writing $\lambda = \ell\lambda^1 + \lambda^2$, we prove that $D(\ell, \lambda)$ is isomorphic to the fusion product of $D(\ell, \ell\lambda^1)$ and $D(\ell, \lambda^2)$. This generalizes the theorem of Fourier–Littelmann who had the additional assumption that $\lambda^2 \in \ell P^+$. In the special case when λ^2 satsifies the condition that its value on every simple root is less than ℓ, we shall see that the Demazure module is prime, i.e., not isomorphic to even a tesor product of nontrivial $\mathfrak{g}$–modules. Finally, we also discuss some generalizations of Q–systems. The talk is based on ongoing joint work with Peri Shereen, R. Venkatesh and Jeffrey Wand.