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高炉粉煤喷吹风口磨损模型及应用

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摘 要：分析了高炉喷吹粉煤颗粒流造成高炉风口壁面底侧的磨损情况,建立了预测高炉风口磨损量的数学模型:$\delta m=\rho_p/\rho_c Hs/Hce(D-dp)dp/2\pi D^2C_{p|r}=RvmE'\cos\theta$.研究结果表明:高炉风口磨损主要与粉煤喷吹量、风口材质、风口几何尺寸、风口半收缩角以及热风速度和粉煤颗粒粒径等因素有关;当粉煤喷吹量相同时,减少粉煤颗粒在高炉风口壁面附近的浓度,改变风口壁面材质和使用较小粒径的粉煤,可减少高炉风口壁面磨损.由该数学模型算出的某钢铁厂高炉风口平均寿命与其实际平均寿命基本吻合,这证明了此模型的可靠性和通用性.

关键字：高炉;粉煤喷吹;风口;磨损

A model and application of the BF tuyere erosion by pulverized coal injection

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Abstract: More than 80 percent of tuyeres are damaged by pulverized coal injection. At the downside of blast furnacetuyere, the erosion due to single pulverized coal injection is analyzed and studied. Based on the case of tuyere, amathe-matical model is established to predict the service life of tuyere that can be described as$\delta m=\rho_p/\rho_c Hs/Hce(D-dp)dp/2\pi D^2C_{p|r}=RvmE'\cos\theta$.The calculated results of the model show that the erosion of blast furnace tuyere has a very close relation with injection rate of pulverized coal, characteristics oftuyere materials, geometrical shape of the tuyere, blastvelocity, halftuyere angle and diameter of pulverized coal particle,etc. Finally,some measures to enhance service life of BF tuyere are given in the case with the same injection rate of pulverized coal such as reducing the consistence of pulverized coal particle near the surface of BFtuyere, changing the material of the surface of BFtuyere and using less diameter of pulverized coal particle. Average service life of 272 days predicted by the model is coincided with actual service life of tuyere that is 260 days in an Iron&Steel Group Company of China. The reliability and the generality of the model is well tested.

Key words:blast furnace; pulverized coal injection; tuyere; erosion

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