r, r_i, r_j , inclusions' radius, m;

R, collision radius, m;

S, circle area with radius of R, m²;

S', the top surface area of bath in tundish, m²;

$U_p(r)$, Stokes floatation velocity of inclusion with radius of r, m/s;

V, volume of liquid steel in tundish, m³;

$\beta(r_i, r_j)$, rate constant of collision, m³/s;

ρ_{Fe}, density of liquid steel, 7 000 kg/m³;

ρ_p, density of inclusions, 3 500 kg/m³;

μ, molecular viscosity of liquid steel, 0.007 kg/(m · s);

ε, turbulence kinetic energy dissipation rate, m²/s³;

ν, kinetic viscosity of liquid steel, 1×10^{-6} m²/s;

suffix i, j, inclusion ordinals.

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Direct Reduction Process of Pellet Containing Carbon with Addition of Zn- Pb-Bearing Iron and Steel Plant Dust

WANG Dongyan   CHEN Weiqing
ZHOU Rongzhang   LI Jingjie   LIN Zongcai

Metallurgy Engineering School, USTB, Beijing 100083, China

Abstract: The study on direct reduction process of pellet containing carbon with the addition of Zn-Pb-bearing iron and steel plant dust shows that the reduction time and pellet basicity have obvious effect on the evaporation of lead and final metallization degree of pellet. The reduction temperature has significantl influences on the lead and zinc evaporation ratios and on final metallization degree of pellet. The optimum process parameters obtained are reduction temperature of 1 250 ℃, reduction time of 25 min and pellet basicity of 0.9.

Keywords: zinc, lead, dust, direct reduction, metallic pellet

Foaminess of Refining Slags System

NIU Sitong   CHENG Guoguang   ZHANG Jian
TONG Fusheng

Metallurgy Engineering School, USTB, Beijing 100083, China

Abstract: The experiments on the foaminess of the $CaO\text{-}MgO\text{-}Al_2O_3\text{-}SiO_2\text{-}CaF_2$ refining slag system have been carried out. The obtained results are as follows: (1) relative foaming height linearly increases with the increasing of the flowrate of blowing gas; (2) the proper content of MgO is about 11% when slag basicity $B<2.5$ and it should lower when slag basicity will be higher; (3) the better content of Al_2O_3, $(MgO)+(Al_2O_3)$ is 15 % and 20 % ~ 26 % respectively at the range of lower basicities; (4) the effect of slag basicity on the foaminess is complex and its optimizing value is 1.9 at the specific contents of MgO, Al_2O_3 and CaF_2.

Keywords: slag, foaminess, refining, CaO-MgO-Al_2O_3-SiO-CaF_2 slags system

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