固体热载体与生物质颗粒之间的传热研究　Study on the Heat Transfer Mechanism between the Solid Heat Carrier and Biomass Particles

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关键词：　陶瓷球 生物质 颗粒 传热

摘　要：　为研究生物质颗粒与陶瓷球固体热载体之间的传热规律，利用自制散体颗粒换热实验台对陶瓷球热载体与气体之间的对流传热特性以及生物质与陶瓷球颗粒之间的传热特性进行了实验研究。采用解析法和RMC关联式法分析出单陶瓷球颗粒与空气的对流换热系数分别为291.3 W/(m2?℃)和200.3 W/(m2?℃)，确定的陶瓷球热载体与生物质颗粒群传热的准则方程分别为 $Nu_c=176+0.079Re_c$和$Nu_b=22.97+0.2251Re_b$，为固体热载体加热生物质热解规律的研究提供了理论基础。　The heat transfer mechanism between biomass particles and ceramic ball heat carriers was the subject of this study. The convective experiments between the ceramic balls and air, as opposed to heat transfer experiments involving the solid carriers and biomass particles and pyrolytic gaseous product, were conducted using the particles-separating apparatus. The convective heat transfer principle between one solid carrier and air as well as between biomass and solid carriers were discussed. According to the experimental data, the convective heat transfer coefficient of one ceramic ball was analyzed based on the theoretical and non-dimensional analytical methods, which were 291.3 W/(m2?℃) and 200.3 W/(m2?℃) respectively. The non-dimensional equations of biomass particles and ceramic balls were also determined via the heat balance analysis method and the non-dimensional equation, which were $Nu_c=176+0.079Re_c$ and $Nu_b=22.97+0.2251Re_b$ respectively.

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