

性良好且热物性被改善的纳米溴化锂溶液，有利于在工程中应用。

关键词 溴化锂溶液；纳米微粒；稳定性；表面张力；沸腾温度

STUDY ON STABILITY AND BOILING TEMPERATURE OF NANO-LiBr AQUEOUS SOLUTION

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Abstract Based on nano-fluid made of lithium bromide(LiBr) aqueous solution, nano-particles and its relevant dispersants, the stability and thermal-physics properties of the nano-fluid were researched through a contrastive experimental method that surface tension and boiling temperature of nano-fluid and pure LiBr aqueous solution were tested respectively. It was discovered experimentally that the surface tension of solution added nano-particles reduces significantly and granularity of the nano-fluid decreases obviously through temperature processing. The nano-particles almost completely dissolves into LiBr aqueous solution, simultaneity the solution shows better stability and both its surface tension and boiling temperature both have a decrease compared with pure LiBr aqueous solution. The study shows that best composition nano-fluids is related to the types and contents of nano-particles and relevant dispersants. Through strict temperature processing, the nano-fluid has a better engineering application than the pure LiBr solution as its good stability and better thermal-physics properties.

Keywords LiBr aqueous solution; nano-particles; stability; surface tension; boiling temperature

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中央空调系统生命周期评价及碳排放评估

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摘要 以生命周期评价(LCA)理论为基础,建立了适用于中央空调系统生命周期碳排放计量方法,提出了以空调系统单位制冷量每年产生的CO₂排放量作为不同类型空调系统对比的指标,便于不同装机容量和使用年限的空调系统的碳排放量比较。结合工程实例,分析了冷水机组、风冷机组、地源热泵三种中央空调系统在生命周期各个阶段的CO₂排放情况,分析了空调系统使用寿命对生命周期碳排放量的影响,比较了不同系统的CO₂排放量。结果表明,系统在运行使用阶段CO₂-eq排放量最大,大约占据了整个生命周期碳排放的96%,主要来源为电力的使用。最后,采用了SimaPro生命周期评价软件对三种中央空调系统进行环境影响评价。结果表明,地源热泵系统回收期最短,碳排放及环境影响最小。

关键词 中央空调; 碳排放; 生命周期评; 环境影响

LIFE CYCLE ASSESSMENT AND CARBON EMISSIONS RESEARCH OF CENTRAL AIR-CONDITIONING SYSTEM

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Abstract Based on life cycle assessment (LCA) theory, established a carbon emissions measurement method applicable to central air conditioning systems, CO₂ emissions produced annually per cooling capacity by air-conditioning system was proposed as an indicator for comparison of different types of air conditioning systems, Which is convenient to compare carbon emissions of air conditioning systems with different capacities and operational life. Combined with engineering examples, analyzed the life cycle CO₂ emissions of three different kinds of central air-conditioning systems and the impact air-conditioning system operational life did to life cycle carbon emissions, Compared CO₂ emissions of different systems by CO₂ pay-back time. The results show that the system CO₂-eq emissions is the highest in running phase, accounting for approximately 96% of the entire life time, the main source is from the usage of electricity. Finally, using a LCA software SimaPro7 to assess environmental impact of central air-conditioning systems. The results showed that the ground source heat pump system has the shortest CO₂ pay-back time, lowest carbon emissions and minimal environmental impact.

Keywords central air-conditioning systems; carbon emissions; life cycle assessment; environmental impact

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变频空调系统中混杂自动机控制与PID控制的对比仿真验证

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摘要 本文通过对变频空调控制系统的混杂特性的探索, 提出了基于混杂自动机的变频空调系统的控制策略, 重点分析了制冷系统中压缩机受温度参数影响的运转频率变化, 介绍了利用混杂自动机对变频空调控制系统的数学模型, 将变频空调系统在混杂自动机控制策略和传统的PID控制策略进行仿真对比验证, 结果表明, 采用混杂自动机控制策略的变频空调系统的收敛速度更快, 能较好地模拟空调室内的能量平衡, 控制压缩机运转频率状态, 以实现室内主要变化因子温度参数的控制, 因而具有更好的效果。

关键词 混杂自动机; 变频空调; 压缩机; 建模与仿真

THE COMPARISON AND SIMULATION OF HYBRID AUTOMATA CONTROL AND PID CONTROL IN THE FREQUENCY CONVERSION AIR CONDITIONING SYSTEM

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Abstract To explore of hybrid features of the frequency conversion air conditioning control system, the control policy was proposed in this paper based on hybrid automata. The change of operating frequency of the compressor in the refrigeration system affected by temperature was focused. The model of air conditioning control system of frequency conversion based on hybrid automata was proposed. The result indicated, comparing the PID model, the convergence rate of this control policy was faster to control the compressor operating frequency.

Keywords Hybrid automata; Air conditioner with inverter; Compressor