

Fluidised glass façade elements for an active energy transmission control

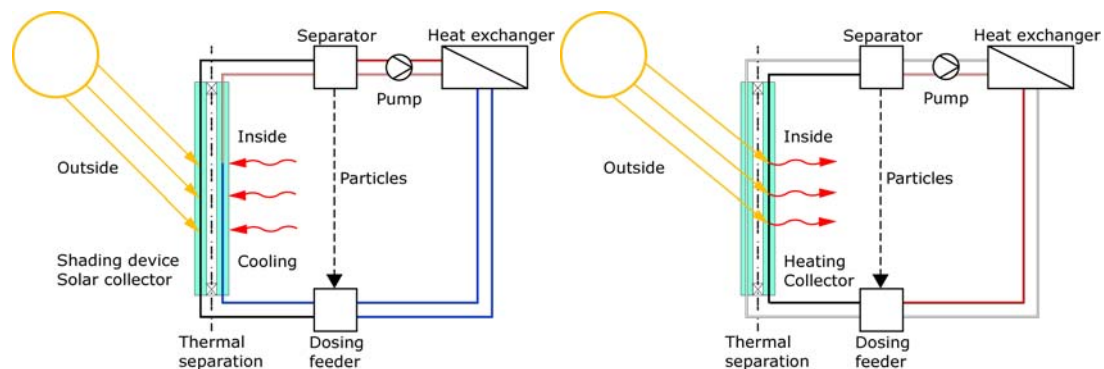
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Abstract: A glass façade system which controls the energy flow within the transparent building envelope is proposed. The façade enables perfect comfort in the building, while simultaneously reducing the energy demand. Two fluid filled layers are implemented in the glass façade. These two layers are regulating all energy flows. The outer liquid layer controls the energy transmission by absorption of solar radiation, while the inner fluid layer keeps the surface temperature just below or above room temperature for heating or cooling. The two basic operating modes in summer (left) and winter (right) are illustrated below.



This system integrates shading device, solar collector, chilled ceiling, floor heating, and insulating façade in one element. A prototype façade element has been built and experimentally tested. The prototype features two fluid layers separated by an insulation glass unit. The concept of the façade system could be proven using a 1.6 m² prototype. A physical model of the façade system has been developed and experimentally validated. Furthermore buildings equipped with this façade system have been simulated in order to determine the performance in different climate zones. At successful completion of the project architects and engineers will receive a standardised product, which helps to increase the efficiency of their building significantly. The user-friendly plug and play system enables the use of renewable energy in an easy way throughout the whole façade area. Because of an active control the system can be used in different climate zones.

Keywords: solar energy, renewable energy, energy efficiency, building envelope

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