The propagation of filtration combustion (FC) waves in a porous solid which reacts with a gaseous oxidizer flowing through its pores may be significantly enhanced by increasing the infiltrating gas flux through the hot porous product region. For relatively small flux, enhancement occurs by the superadiabatic effect, i.e., by increasing the maximum temperature ($T_b$), and thus, the reaction rate $W(T_b)$ in the combustion front. Though convection of heat from the product region increases $T_b$, the mechanism of FC wave propagation is controlled by diffusion of the heat released in the reaction.

An alternative mechanism of enhancement, which occurs for relatively large gas fluxes, and corresponds to pronounced temperature nonequilibrium between the gas and solid phases, leads to an increase of the FC wave velocity without increasing the combustion temperature. The propagation of such waves is controlled by the convection of heat stored in the products, rather than by diffusion of the heat released in the reaction. Such waves may propagate if diffusion is minimal or even absent altogether, due, e.g., to poor contact between the particles comprising the porous matrix.

Unlike conventional (diffusion driven) combustion waves, the combustion velocity of convection driven FC waves is not controlled by the maximum temperature $T_b$, but rather by an intermediate temperature $T_I$ which launches the reaction. In this sense the situation is similar to that in detonation waves. Here, $T_i$, the temperature at which the rate of heat release in the reaction equals the rate of heat exchange between the gas and solid phases, is the temperature at which the reaction begins to self-accelerate.