Fractures sealing by mineral precipitation from hydrothermal solution is an important process affecting permeability and dynamics of hydrothermal systems. In most cases this phenomenon is considered in the framework of Darcy’s theory assuming thermal equilibrium between fluid and rock matrix. This assumption could not be valid for the zones of focused flow in seafloor hydrothermal systems. Lowell & Germanovich (1993) in their principal work developed a model for sealing of individual fracture by precipitation of silica due to cooling of hydrothermal solution flowing through channel in a rock massif. This approach was used later to estimate the closure time for cracks sealed by precipitation of anhydrite as well as silica.

In this study we consider the mineral precipitation from a fluid flowing through a system of planar fractures. Various regimes of flow are considered, and the relevant scenarios of self-sealing process are established. The existence of critical value for the initial width of fractures is demonstrated. It is shown that the evolution of the upflow zone is highly dependent on whether the initial width of fractures is larger or smaller than the critical value. In the last case the system of fractures can be uniformly sealed upon some time. The former case includes the second stage when sealing tends to move from the peripheral parts of the system to the central ones.