We present a numerical model of Bridgman crystal growth. Pseudo-incompressibility constraint is used to handle jumps in density during phase change. ALE formulation is employed to account for moving parts of the system. Field equations and movement of material interfaces are decoupled in fractional step manner. Naviér-Stokes problem is extended to solid phase where no flow is enforced by Darcy-like forcing. Latent heat of phase change is added to effective heat capacity as approximate Dirac-δ. Backward Euler discretization in space and P2/P1/P1 in space are used. Transient and stationary solutions are being found and compared to temperatures measured directly inside a steady system. Influence of pull-rates on growth process and shape of phase interface are being examined.