

Temporal profiles of spinline variables in fiber spinning process accompanied by flow-induced crystallization

신동명, 이주성, 정현욱, 현재천*
고려대학교 화공생명공학과
(jchyun@grtrkr.korea.ac.kr*)

The transient behavior of fiber spinning process when flow-induced crystallization occurs on its spinline has not been reported yet in the literature, whereas the steady state behavior has been well understood and simulated by various researchers as well as the transient behavior without crystallization on the spinline. In this study, this particular issue has been investigated incorporating flow-induced crystallization into the mathematical model of the system and then devising proper numerical schemes to produce the temporal pictures of the system. It turns out that the difficulty to obtain the transient solutions of fiber spinning accompanied by flow-induced crystallization lies in the extreme sensitivity of the spinline velocity toward the fluid stress level at the spinneret. With the successful transient solutions of fiber spinning with flow-induced crystallization, the stabilization and optimization of not only fiber spinning but also other extensional deformation processes can be readily pursued using the information on the transient behavior.