

**One-dimensional free boundary problem for actin-based propulsion of *Listeria*,
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Abstract

Some bacteria move inside cells by recruiting the actin filaments of the host cells. The filaments are polymerized at the back surface of the bacteria, and they move away, forming a “comet” tail behind the bacterium, which consists of gel network. We develop a one-dimensional mathematical model of the gel based on partial differential equations, which involve the number of filaments, the density and velocity of the gel, and the pressure. The two end-points of the gel form two free boundaries. The resulting free boundary problem is rather non-standard. We prove local existence and uniqueness.