cases	doc_1	doc_2	decision	id
	authors: Sergei Fomin; Ravi Shankar; Peter Haine; Vladimir Chugunov **title**: Stability analysis of non-Newtonian rimming flow **publication_date**: 2016-01-01 00:00:00 **source**: SupportedSources.INTERNET_ARCHIVE **journal**: Elsevier BV **volume**: **doi**: 10.1016/j.apm.2015.09.088 **urls**: https://web.archive.org/web/20180719165606/https://manuscript.elsevier.com/S0307904X15006228/pdf/S0307904X15006228.pdf **id**: id2586679125351552242 **abstract**: The rimming flow of a viscoelastic thin film inside a rotating horizontal cylinder is studied theoretically. Attention is given to the onset of non-Newtonian free-surface instability in creeping flow. This non-inertial instability has been observed in experiments, but current theoretical models of Newtonian fluids can neither describe its origin nor explain its onset. This study examines two models of non-Newtonian fluids to see if the experimentally observed instability can be predicted analytically. The non-Newtonian viscosity and elastic properties of the fluid are described by the Generalized Newtonian Fluid (GNF) and Second Order Viscoelastic Fluid (SOVF) constitutive models, respectively. With linear stability analysis, it is found that, analogously to the Newtonian fluid, rimming flow of viscous non-Newtonian fluids (modeled by GNF) is neutrally stable. However, the viscoelastic properties of the fluid (modeled by SOVF) are found to contribute to the flow destabilization. The instability is shown to increase as the cylinder rotation rate is lowered, from which the fluid accumulates in a pool on the rising wall. Viscoelastic effects coupled with this pooling cause the fluid's angular stretching, which is suggested to be responsible for this onset of instability. **versions**:	**authors**: Sergei Fomin; Ravi Shankar; Peter Haine **title**: Stability Analysis of Non-Newtonian Rimming Flow **publication_date**: 2015-09-17 00:00:00 **source**: SupportedSources.INTERNET_ARCHIVE **journal**: **volume**: **doi**: **urls**: https://web.archive.org/web/20200912103151/https://arxiv.org/ftp/arxiv/papers/1509/1509.05102.pdf **id**: id5834660024440575072 **abstract**: The rimming flow of a viscoelastic thin film inside a rotating horizontal cylinder is studied theoretically. Attention is given to the onset of non-Newtonian free-surface instability in creeping flow. This non-inertial instability has been observed in experiments, but current theoretical models of Newtonian fluids can neither describe its origin nor explain its onset. This study examines two models of non Newtonian fluids to see if the experimentally observed instability can be predicted analytically. The non-Newtonian viscosity and elastic properties of the fluid are described by the Generalized Newtonian Fluid (GNF) and Second Order Viscoelastic Fluid (SOVF) constitutive models, respectively. With linear stability analysis, it is found that, analogously to the Newtonian fluid, rimming flow of viscous non-Newtonian fluids (modeled by GNF) is neutrally stable. However, the viscoelastic properties of the fluid (modeled by SOVF) are found to contribute to the flow destabilization. The instability is shown to increase as the cylinder rotation rate is lowered, from which the fluid accumulates in a pool on the rising wall. Viscoelastic effects coupled with this pooling cause the fluid's angular stretching, which is suggested to be responsible for this onset of instability. **versions**:	DUPLICATES	391