

Problem

Steady thin film flow of non-Newtonian fluid on vertical cylinder for drainage problems

Mathematical Model

$$\frac{dw}{dr} + \phi W_e^2 (1 - a^2) \left(\frac{dw}{dr} \right)^3 - \frac{S_t}{2} W_e^2 (1 - a^2) \left((1 + d)^2 \frac{1}{r} - r \right) \left(\frac{dw}{dr} \right)^2 + \frac{S_t}{2} \left((1 + d)^2 \frac{1}{r} - r \right) = 0$$

SCENARIOS

I

Variations in S_t

Case I : $S_t = 0.1$

Case II : $S_t = 0.2$

Case III : $S_t = 0.4$

II

Variations in W_e

Case I : $W_e = 0.1$

Case I : $W_e = 0.1$

Case III : $W_e = 0.4$

III

Variations in ϕ

Case I : $\phi = 1.0$

Case I : $\phi = 2.0$

Case I : $\phi = 3.0$

IV

Variations in a

Case I : $a = 1.0$

Case I : $a = 0.8$

Case I : $a = 0.5$