Instability of dilute suspensions in a channel coated with porous media[1] PARISA MIRBOD, ZHENXING WU, Clarkson University — We present the linear instability analysis of plane Poiseuille flow of low concentrated suspensions in a channel coated with random soft porous media. The system consists of low concentrated suspensions over soft random porous media at low Reynolds numbers. We used the linear stability analysis, carried out via spectral methods to model perturbations from the coupled Brinkman and suspension models. To calibrate our code and our calculation procedure, we compared our data to the classical plane Poiseuille flow of previous works. Our results are in good agreement with Orszag's result to solve the Orr-Sommerfeld instability equation. In the limit when Reynolds number is very low and there is no porous media in the channel, we found stability in the system, i.e., the characteristics of incompressible Newtonian flows in a smooth Poiseuille flow. However, we found the depth ratio between free fluid and porous medium, the porosity, and permeability of porous medium have critical effect on instability. Depending on these parameters, the instability occurs in the so-called fluid mode or porous mode.

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