Referee’s comments on manuscript micromachines-606855:

Squeezing dynamics mechanism of high-viscosity droplet and its application for adhesive dispensing in sub-nanoliter

The manuscript presents a study of the dynamics of squeezing and break-up of viscous droplets for an application to deposit less than one nano litter of liquid. This subject is interesting and may have great application in precision industry. I thus encourage the authors to continue and improve their research.

However, the manuscript conveys physical errors and misconceptions that cannot be published in a scientific paper. The manuscript is also not well written and does not meet academic writing and presentation standards. I think that the manuscript have to be rejected. A revised version of this paper cannot be envisaged, it has to be completely changed before being submitted again.

My point of view is supported by the following arguments:

Scientific points:

Modelling
— The starting equation, Equation (1), is WRONG. Surface forces account as a boundary condition and cannot be mixed up with the equation describing the bulk of liquid (i.e. Navier-Stokes equation). I dug in the reference paper cited by the authors to support their claim (ref 20).
In the paper of Brackbill et al, the goal is to describe the interface as a continuum between two fluids. For obvious numerical problem (mainly stability) they define a transition region in which surface tension is treated as a continuum property. Obviously they check that the effect of the two models (transition zone with continuum surface tension and pressure jump condition are equivalent.
In the present paper, no transition zone is defined, to equivalence check is done, and even worse the pressure force is not even correctly written.
— L 107 : you write that the motion of the droplet should be a low speed flow and make the association with the mass conservation equation. Which was already evoked L 103 under the approximation of incompressibility.
— L119 : The definition of the surface $S_m$ is WRONG. You do not take into account the inclination toward the z-direction.
With those 3 points, I cannot believe the model presented by the authors. The model does not take into account some basic physical principle.
Experiment

— L170 The reader does not understand what is meant by contact force. Is it the force at rest? at minimal position? Nothing is given to reproduce the experiment.
— L181 Equation 8 does not make sense, what is $n$? the pixel position? authors tell about the physical scale $x$ but no link is given with the volume computation.
— contact angles $\alpha_i$ and $\beta_i$ are not defined except in figure 6.
— We do not know if Figure 7 is obtained by numerical computation of physical measurement.
— L187 authors told about picoliter droplet but reports values in the order of 70 picolitters figure 6.

With all those extremely major bad points, I doubt that the results of part 4 may have any sense. This paper have to be rejected.