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The rise velocity and shape of an air bubble moving in HASE fluid E. SOTO, C. GOUJON, T. BEHAGHEL, R. ZENIT, IIM-UNAM, Mexico — Experiments were conducted to determine the shape and the rise velocity of an air bubble moving in a HASE fluid. These type of non Newtonian materials can be classified as associative fluids, because their internal structure is formed by hydrophobic molecules which associate or dissociate as a result of flow. In particular, the liquid used in this investigation has a nearly constant shear viscosity for a wide range of shear rates but shows significant elasticity above a certain critical shear rate. Millimetric size bubbles were released from rest in a tall cylindrical container. Two types of images were obtained: high resolution photographs, from which the bubble shape and volume were obtained; and, low resolution high speed videos were used to measure the bubble velocity. We found that the bubble velocity increases with the bubble volume; however, a sudden increase of the bubble velocity is observed as the bubble volume reaches a critical value. This phenomena, known as the bubble velocity discontinuity, has been observed in other non Newtonian fluids but, to our knowledge, has never been reported for associative fluids. Additionally, we identified that a significant change of the bubble shape occurs along with the appearance of the velocity discontinuity. Moreover, by performing PIV measurements we are able to relate the appearance of the velocity jump with values of the local shear rate at which the elasticity of the fluid becomes important.

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