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Politechnika Rzeszowska
im. Ignacego Łukasiewicza

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AGGREGATION OF SPHERICAL PARTICLES IN SHEAR FLOW

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Key words: coagulation, shear flow, Brownian motion

The problem of aggregation of Brownian particles in external shear flow is considered. The particles are spherical and the approximation for two particle interactions is used. The aim is to extend the study of Smoluchowski (1907) to include the effect of shear flow on the coagulation process with and without the hydrodynamic interactions. The results are obtained both for small and large Peclet numbers, $Pe=Ud/\kappa$, and the corrections to the total concentration flux are obtained – the shear is found to increase the coagulation rate. The limit of large Peclet numbers for the case without the hydrodynamic interactions turned out to be most singular with many different length-scales, such as Pe^{-1} , $Pe^{-2/3}$, $Pe^{-1/2}$, $Pe^{-1/3}$, and a large variety of boundary layers with different structures not only at the sphere, but also behind it, i.e. on the side where the flow leaves the spherical particle.

REFERENCES

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