CONVERGENCE OF A FINITE VOLUME SCHEME FOR A SORPTION-COAGULATION EQUATION

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Abstract. This work is devoted to the derivation and the mathematical study of a new model for water-soluble polymers and metal ions interactions, which are used in chemistry for their wide range of applications. First, we motivate and derive a model that describes the evolution of the configurational distribution of polymers. One of the novelty resides in the configuration variables which consider both, the size of the polymers and the quantity of metal ions they captured through sorption. The model consists in a non-linear transport equation with a quadratic source term, the coagulation. Then, we prove the existence of solutions for all time to the problem thanks to classical fixed point theory. Next, we reformulate the coagulation operator under a conservative form which allows to write a finite volume scheme. The sequence of approximated solutions is proved to be convergent (toward a solution to the problem) thanks to a $L^1 - weak$ stability principle. Finally, we illustrate the behaviour of the solutions using this numerical scheme and we intend to discuss on the long-time behaviour.

References

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