

A review of the application of the finite element smeared concept to biomedical engineering problems

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Abstract: The biomechanical and biochemical processes in the biological systems of living organisms are extremely complex. Advances in understanding these processes are mainly achieved by laboratory and clinical investigations, but in recent decades they are supported by computational modeling. Besides enormous efforts and achievements in this modeling, there still is a need for new methods which can be used in everyday research and medical practice. In this review, first are presented the basic assumptions in the formulation of the smeared concept, termed as Kojic Transport Model (KTM) model - introduced by the author several years ago. Then, it is demonstrated the distinction and advantages of the KTM by referring to selected publications in the literature. Application of the KTM is illustrated on several examples which include drug delivery in tumors, heart electrophysiology, and lung airflow and molecular transport by diffusion.

Keywords: smeared finite element, Kojic Transport Model, biomechanics, engineering