The study tries to develop a numerical model for the behavior of asphalt mix. Asphalt mix is constituted with asphalt binder, which is a viscoelastic material, and stone aggregates, which are irregularly shaped solid particulates dispersed in high concentration. In this work asphalt mix samples are modeled for irregular aggregates as well as for random elliptical aggregates. The irregular shaped aggregates are obtained by tracing out the original aggregate shapes from cross-sectional image of asphalt mix sample and detecting aggregate boundary by image processing technique. The modeling and meshing is done in the sequence given in Fig.1. The meshing is done using a Finite Element software ANSYS.

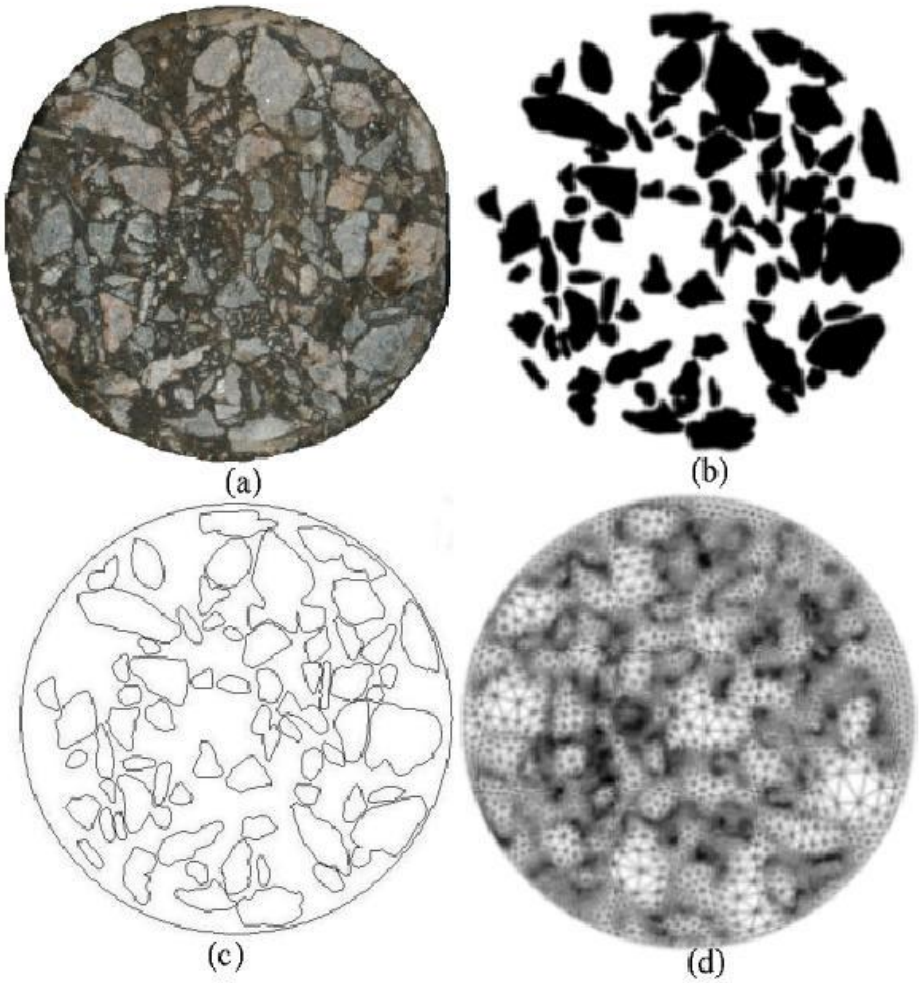


Fig.1 Modeling and mesh generation of irregular aggregate samples.

The elliptical aggregate samples are prepared by generating non overlapping ellipses of random shape and orientation. The modeling and meshing of elliptical aggregate samples are shown in Fig.2.

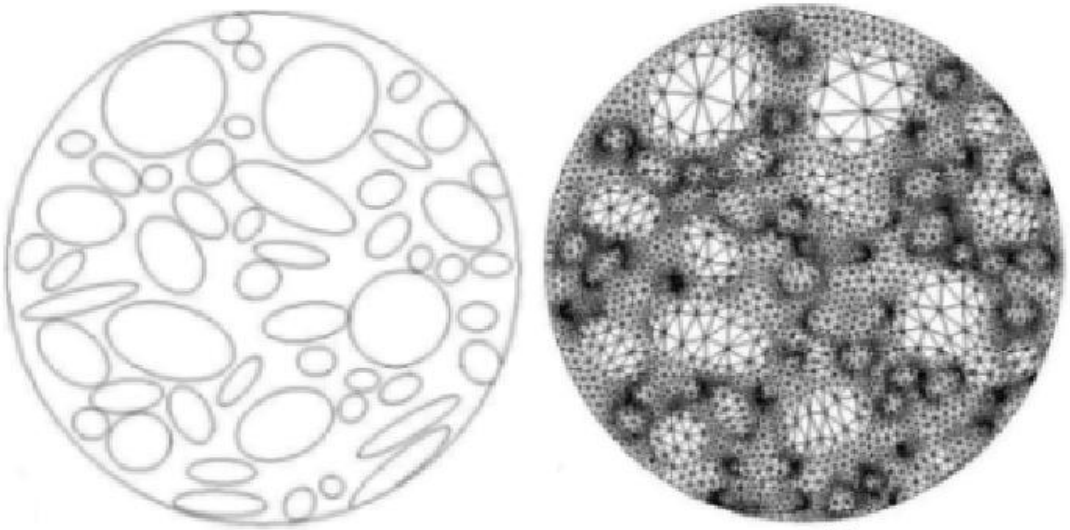
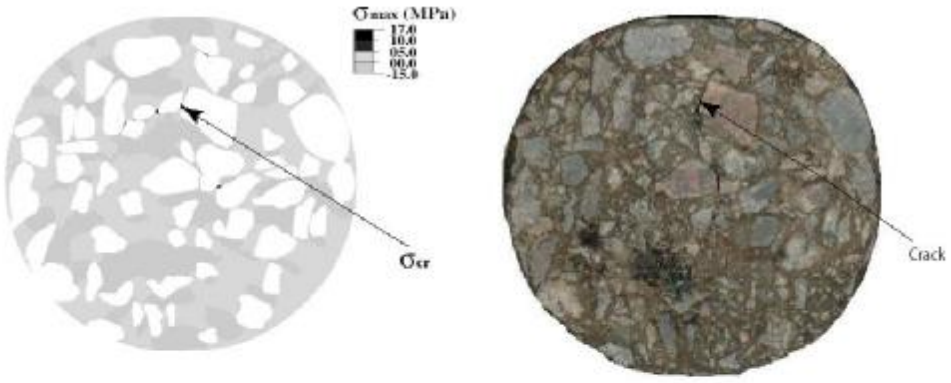
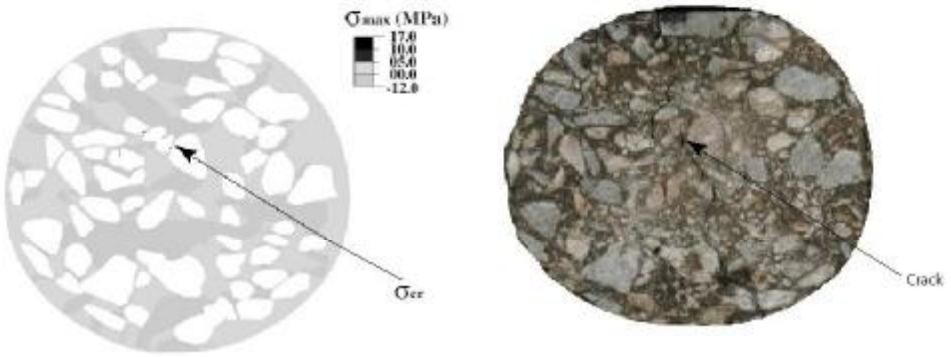


Fig.2. Model and Mesh of elliptical aggregate samples.

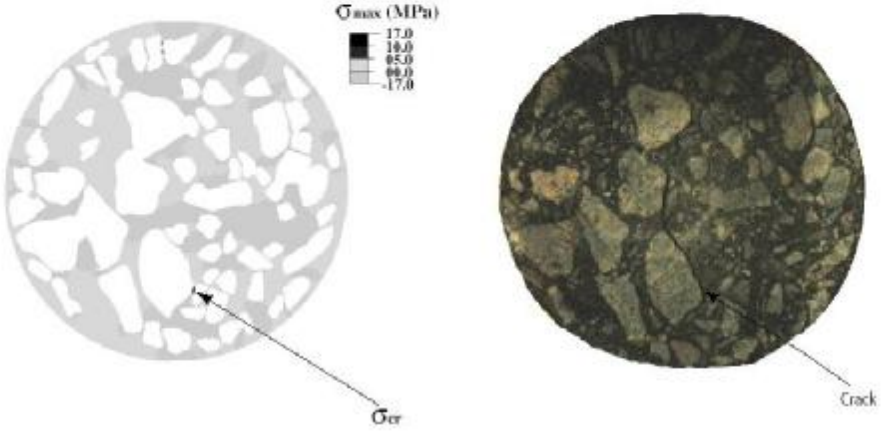
The bitumen binder, air voids and small size aggregates together are assumed to behave like a viscoelastic material idealized with a Dirichlet-Prony series and its property is determined from relaxation test performed in the laboratory on such a mix. The overall behavior of the asphalt mix is studied for variations in constituent proportions and morphology using FEM analysis and the results are compared with the experiments performed on asphalt mix. The crack location of predicted by model is seen to predict the actual scene quite well as shown in Fig.3.



Sample (A)



Sample (B)



Sample (C)

Fig.3 comparison of crack initiation location.