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Cosmological spherical collapse in the framework of the Chaplygin gas model YOUSEF IZADI, University of Massachusetts Lowell, AMIN REZAEI AKBARIEH, MOHAMMAD AHMADI, University of Tabriz, SHAHABEDDIN M. ASLMARAND, WARNER A. MILLER, Florida Atlantic University
— In recent years, models that explain dark energy have been extensively studied. These models include scalar-tensor models such as quintessence, tachyons, and k-essence. The Chaplygin gas model is another interesting class of dark energy models that assumes the universe is full of a peculiar perfect fluid. It is important to note that in addition to describing the dark energy, scalar-tensor models and the Chaplygin gas model can explain the cosmological spherical collapse. In this talk, we use the Chaplygin gas model to describe the spherical collapse of the cosmological structures. To this end, we study the scalar quintessence model with especial potential and show this model is equivalent to the Chaplygin gas model. Then, by solving the overdensity evolution equation, we obtain all the parameters of the spherical collapse model. Based on the results, we claim that the formation of the large scale structures occurs earlier than predicted in the standard cosmological model. Then, we investigate the spherical collapse model in the framework of the tachyon scalar model with constant potential and obtain similar results.

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