

In the study, predictability of Marshall Stability (MS) of light asphalt concrete that fabricated using expanded clay and had varied mix properties with Fuzzy Logic (FL) were researched. With this aim, asphalt concrete samples that added expanded clay aggregate (EC) in accordance with gradation determined in Highway Technical Specification, had different percentage of bitumen (POB) (4.5%, 5%, 5.5%, 6%, 6.5%, 7%, 7.5%, 8%, 8.5%, 9%, 9.5%, 10%, 10.5%) and unit weight (UW) (1,75–1,87 (gr/cm<sup>3</sup>)) were prepared and determined Marshall stabilities with Marshall test. After that Fuzzy Logic Model was conducted with the Marshall Stability results. In the model developed by FL method the amount of bitumen (%), transition speed of ultrasound ( $\mu$ s) and unit weight (gr/cm<sup>3</sup>) were used as input variable and Marshall Stability (kg) parameters were used as output variable. In the study rules were written depending on the membership functions determined for input variables. In the defuzzification process center of gravity method was used. As a result, Marshall Stability of asphalt concrete fabricated using expanded clay aggregate, with FL method, can be determined in a short time easily, in a very low error rates and without an experimental study.