

The purpose of this study is to formulate a steel fibre reinforced selfcompacting concrete (SFSCC) that has optimal rheological and mechanical properties, using marble powder as an addition and partial substitution to cement. The design of experiments method (DOE) was used to analyse the effect of fibre dosage (%f), paste volume (V_p) and the gravel/sand ratio (G/S) on the SFSCC. A concrete rheometer is used to quantify the intrinsic rheological parameters. The rheological results of the SFSCC show that the flow capacity decreases with increasing fibre dosage. By against the increase in the volume of the paste (V_p) and the (G/S) ratio decreases the yield stress to give better performance to flow. The plastic viscosity is governed exclusively by the volume of the paste. Mechanical results showed that the volume of the paste has a significant influence on the flexural strength as well as the compression strength. Moreover, significant improvement in flexural strength is recorded when the three parameters (%f, V_p and G/S) increase. Also, the ductility of SFSCC increases with increasing fibre dosage, while the compressive strength is little affected by the latter.