Abstract

In petroleum drilling, many anionic polymers are used to control the rheology of water-based muds (WBM). The carboxymethylcellulose (CMC) is used in drilling fluid formulations as a fluid loss reducer for fresh water-based muds, but it also acts as viscosifier in drilling fluids. In this study, the effect of concentration and molecular weight of CMC on the rheological behavior of polymer solutions in aqueous media has been investigated experimentally. Three CMC at different molecular weights (i) CMCLV(9×10^4g/mol) (ii) CMCMV(25×10^4 g/mol), and (iii) CMCHV(7×10^5 g/mol) were studied. The rheological tests were performed by means of a controlled stress rheometer AR 2000 equipped with a cone-plate geometry. The rheological properties of these solutions were measured between shear rates of 0 to 1000 s-1, the concentration of polymers has been varied from 0.1% to 3.0% in weight. The results show that CMC solutions are non-Newtonian and present pseudoplastic behavior. Regardless the concentration and type of CMC used, all CMC solutions don't exhibit yield stress. Experimental values of CMC at low molecular weight were fitted well by the Ostwald-de Waele model to the shear stress and shear rate values, it was found that flow index values remain close to unity for all studied concentrations, whereas the consistency coefficient increases slightly when the polymer concentration increases. The Cross and Carreau-Yasuda models have been used to fit the rheograms for CMCMV and CMCHV solutions. The increase of predicted zero shear viscosity by these models is very important for high concentrations in polymers (> 2% for CMCMV and> 1% for CMCHV)