We present the results from stability analysis on viscous-plastic sea ice formulation. In recent years the stability of this formulation, which is a standard component in many of the present-day sea-ice/atmosphere/ocean coupled models, has become a subject of controversy. In the context of sea-ice dynamics, an issue of stability arises due to a discontinuity in the stress state associated with yielding, thus to the extent inherent to the plastic formulation. In this study we introduce an approximation method, by which this discontinuity is treated as a limit for a sequence of continuous and well-behaved constitutive relations. This method in turn gives both an analytically and numerically stable solution to the problem. In particular we shall show that for the 1-D case the approximate model is stable in the limiting sense and further eliminates a need for an artificial diffusion term from the sea-ice model. We shall also discuss the extension of the approximation method to the 2-D framework.