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Finite strain and kinematic vorticity analyses and boudin classification of Zagros high stain zone, Iran

Khalil Sarkarinejad and saeede Keshavarz
shiraz, shiraz, department of earth scienses, shiraz, Islamic Republic Of Iran (s.keshavarz2007@yahoo.com)

Asymmetric boudins are widespread in the Seh- Ghalatoun area and are good indicators to estimate quantitative finite strain (Rs), kinematic vorticity number (Wk) and sense of shear. This area is a part of the HP-LT Sanandaj Sirjan Metamorphic Belt within the Zagros Orogenic Belt. Boudins in the mesoscopic to microscopic scales are considered for the structural analysis. The boudins are classified as domino boudin, shear-band boudin and mantled porphyroclast. These bodins are made up from the quartzite layers in gneiss. Shear band boudins with backward rotation and domino boudins with forward rotation, drag folds, mantled porphyroclast and asymmetric folds display dextral sense of shear. Using the asymmetric boudins hyperbolic distribution method and quartz strain-ratio/c-axis patterns from the quartz mylonite, mean kinematic vorticity number were estimated. The estimated mean kinematic vorticity number (Wk) and mean finite strain value (Rs) are Wk=0.81+0.02 and Rs=2.95 +0.26, respectively. During plastic deformation and dynamic recrystallisation, the opening angle of the quartz c-axis increases with increasing temperature and/or water content. Using this geothemometer, the opening angles of quartz c-axis fabrics of the quartzite layers of the high-grade gneisses indicate a mean deformation temperature of 515° 50°C. This result indicate that the amphibolite facies conditions for deformation. The estimated mean kinematic vorticity number (Wk) value indicates 39.5% pure shear component relative to 60.5% simple shear component (corresponding to Wk=Wm=0.84).