Disclination Modeling for Microscopic Structure of Kink Deformation Band

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Development of Kink band are one of typical deformation manner in some magnesium alloy. It can be thought that Kink-type deformation occurs after some instability under compressive force. However, the mechanism has not been fully clarified, yet. In this work, the disclination model for kink bands is proposed. The stress field near disclinations is obtained by the computational approach, such as an extended finite element method, in which the proper discontinuity of displacement field in a elastic body is taken into account, and it is compared with analytical solutions. To deal with geometrical nonlinearity which contributes to the evolution of kink deformation, the formulation of finite deformation theory is discussed.

Keywords: Kink band, Disclination, X-FEM, Magnesium alloy