

SMA Confinement of HDPE Pipes: Enhancement of the Joint Fracture Resistance

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Abstract: This study was to provide a new aspect of application of shape memory alloys (SMAs) in civil engineering. The high-density polyethylene (HDPE) have been used for construction of pipelines for several years. The main problem of using HDPE for pipes is the joint of two adjacent pipes. In case of having a perfect joint, the HDPE pipeline can bare the internal pressure up to 90 MPa. However, in practice, it can rarely achieve to a perfect pipe joint due to the complicated process, so, it prone to fracture in low internal pressure. To overcome this, this study investigated the efficiency of wrapping and confinement of HDPE pipe at the joint to enhance the internal pressure baring capacity. For this aim, the NiTi SMA wires were used for the confinement of the pipe joint. Then, the pipe system was connected to two high speed water injector system at both sides to provide full flow through the pipes. To track and measurement of the displacement LVDT together with high speed camera were used. Results showed that SMA confinement of the joint could efficiently enhance the resistance of the pipe joint as that of a perfect joint.