Fatigue life of submarine pipelines is known to depend on many factors, e.g., materials, spanning length, vortex induced vibration (VIV), pipe soil-interaction, etc. In the case of VIV, the external flow due to marine currents can generate the well known alternate vortex shedding regime. In this regime, a time-varying pressure distribution over the surface of the pipeline imposes forces upon the pipeline itself, thus producing vibration with a defined frequency. On the other hand, in recent years some authors have shown that slug flow regime may produce a cyclic damage that could reduce in a significant way the fatigue life of submarine pipelines, thus constituting a governing mechanism in their design. In slug flow regime, slugs traveling in the pipe act as moving gravity loads for the pipeline structure, producing a dynamic response, especially important for the free spans. If both frequencies of the before mentioned effects are closer and, in addition, are in the same range of the natural frequency of the pipeline span, resonance effects can be expected to be reinforced and drastic changes in the dynamics of the pipeline could appear. In this work, a first study of the interaction between slug flow induced vibration in horizontal pipelines and cross-flow response due to vortex shedding is presented. The fluid model was based on the classical wake oscillator model. A numerical model based on the finite difference method was implemented for the structure. Two particular extreme cases were modeled to analyze the pipeline dynamics for “small-size" and “large-size" slugs, for a range of marine current velocities. For the case involving small-size slugs, it was observed a near 10% increment in the vibration amplitude (compared to a reference value), while in the case of “large-slugs" the VIV was overweighted by the slug induced vibration (SIV) phenomenon. [DOI: 10.1115/1.4028027]