Mathematical models can be used to accurately describe dynamic systems in many diverse disciplines, ranging from economics to physics. The field of system identification aims to construct such models from observed data. Once developed, these models provide valuable information and further understanding of the system, allowing the estimation and prediction of the system’s behavior. One proposed method, Epigenetic Linear Genetic Programming (ELGP), uses genetic programming based on symbolic regression to efficiently develop models given no initial equation. One poorly understood system, and the topic of this research, is vortex-induced vibrations (VIV). This phenomenon occurs when a fluid induces vibrational motion on a given body, potentially resulting in fatigue damage such as for offshore wind turbines. The purpose of this project is to employ ELGP in an attempt to improve upon the classical van der Pol equation commonly used to describe VIV. Ideally, our findings will assist engineers in designing offshore structures to further withstand fatigue damage.