1 Summary

1.1 Contributions

This dissertation presented two strategies to tackle the unpredictability of the mechanical response of Fused Filament Fabrication parts. The first, involved deployment and validation of a failure surface for FFF parts. The second, lead to the deployment of a Neural Network capable of predicting the expected mechanical response of FFF parts in terms of the tensile strength and Elastic modulus in 0° and 90° orientations. Additionally, the specialized 3D printer used to develop this Machine Learning system allowed generating data and models capable of relating printing parameters and process indicators to the necessary force required to overcome the pressure gradient within the FFF nozzle. These results indicate that the analytical models available in literature at the moment do not fully capture the intricacies of the rheological phenomena ocurring during the printing process.

Chapter **??** showed how the SSIC was capable of predicting the failure stress of 3D printed parts at a variety of raster angles with a maximum error of 8%, indicating that the threshold determined by the SSIC applied for FFF is appropriate.

1.2 Suggestions for Future Work

1.3 Publications