ON A CLASS OF SIMPLE LIFETIME REGRESSION MODELS, MULTIPLE TIME SCALES AND FIRST-HITTING TIME MODELS

T. Duchesne

Université Laval, Québec, Canada

† E-mail: duchesne@mat.ulaval.ca

Oakes (1995), Kordonsky and Gertsbakh (1997) and Duchesne and Lawless (2000) consider a class of simple regression models for lifetime given the history of an increasing covariate that can be viewed as an alternate measure of age. These so-called "collapsible models" are appealing due to their interpretability and potential for non-parametric inference, and they fit several types of datasets quite well; Oakes (1995) uses them to model the lifetime of miners exposed to asbestos dust and in an analysis of the Channing House retirement center data, while Kordonsky and Gertsbakh (1997) and Duchesne and Lawless (2000) use them in reliability data analyses. Unfortunately, the assumption of "collapsibility" is relatively strong and there is no omnibus test of this assumption. In this talk, we will first review collapsible models. We will then see how collapsible models can arise in a first-hitting time setup. As we will see, if we define death (or failure) as the first time a certain non-increasing (or non- decreasing) state of health (or internal wear) process crosses a threshold, then under certain conditions on the process and the threshold, collapsible models are obtained. By giving practical interpretations to these conditions on the process and the threshold, we will find some practical situations where the use of collapsible model is justified.