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Creep damage in a localized load sharing fibre bundle model with additional ageing

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Many fields of science are interested in the damage growth in earth materials. Often the damage propagates not in big avalanches like the crack growth measured by acoustic emissions. Also “silent” damage may occur whose emissions are either to small to be detected or mix with back ground noise. These silent emissions may carry the majority of the over all damage in a system until failure. One famous model for damage growth is the fibre bundle model. Here we consider an extended version of a localized load sharing fibre bundle model which incorporates additional time dependent ageing of each fibre motivated by a chemically active environment. We present the non-trivial time dependent damage growth in this model in the low load limit representing creep damage far away from failure. We show both numerical simulations and analytical equations describing the damage rate of silent events and the corresponding amount of triggered “acoustic” damage. The analytical description is in agreement with the numerical results.