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The prediction of long-term creep data of fibrous polymer composites based on short term experiments

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After a short review of the historical development of the time-temperature superposition principle, its application for the extrapolation of creep modulus curves will be discussed with the help of two examples. Conditions for the applicability of the principle for fibrous polymer composites will be pointed out. The normalization of the measured data will be revealed. The construction of the master creep modulus curve will be demonstrated in detail. The extrapolated values resulting from the superposition of short-term creep data of an unsaturated polyester-glass fiber composite are going to be compared with the results of long-term creep experiments. Based on this outcome, it can be concluded that the time-temperature superposition principle is for the prediction of long-term creep behavior a suitable tool for R&D-laboratories to get a good impression about the tendency of the long-term creep behavior of fibrous composites.

Biography

Urs Meier has held various positions at the Swiss Federal Laboratories for Materials Science and Technology (Empa). In 1983, he rose to the rank of the Managing Director of Empa in Dübendorf, a position that he held until his recent retirement. In addition, he has also been Professor at the Swiss Federal Institute of Technology (ETH) in Zurich. Over the years, his accomplishments in the application of fibrous polymer based composites in civil engineering have had a tremendous impact on the field. Especially noteworthy is his work on the post-strengthening of civil structures with carbon-fiber-reinforced polymer strips, which has been successfully implemented at a growing rate worldwide and the application of CFRP stay-and post-tensioning cables.

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