



Review of: a brief history of aqueducts and conduit resistance laws by Michele Mossa

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Michele Mossa, Professor of Hydraulics at the Polytechnic University of Bari, has done us a great service by documenting the fascinating history of aqueducts and conduit resistance laws. By “us” I am not only referring to students of hydraulics, but to the public at large. While not shying away from technical issues, this book presents the history of aqueducts, and the development of our understanding of the factors affecting flow in them, in a manner that should appeal to a general audience. This book is enhanced by many captivating photographs of a wide array of aqueducts, and the people who contributed to their understanding, design, construction and operation.

The book is divided into six main sections. The first section is devoted to the aqueducts of ancient civilisations. It includes descriptions and fascinating photographs of five aqueducts: the drainage channel at Knossos, the aqueduct constructed by the Athenian tyrant Peisistratos, the Dujiangyan irrigation system in Chengdu, the spiral entrance to the Nazca aqueduct known as Puquios, and the geometrically complex stepped well of the Hampi aqueduct. I was not previously aware of any of these sites and could not resist taking the time to find out more about each of them. As a result, it took me several hours to complete this short section, and left me with the desire to visit each of these marvels, which appear to still be in excellent condition.

The next section provides a brief, but compelling overview of the Roman aqueducts that were vital to urban life and civil society, providing fresh clean water for baths and fountains, and drinking water for ordinary citizens. Professor Mossa gives us an appreciation for the amazing feats of engineering involved in the construction (between 312 BC and 226 AD) of these aqueducts. He also highlights the administration involved in the development and maintenance of these water supply systems. Remarkably, after the decline of the Roman empire the same level of water supply and quality was not achieved again until the twentieth century.

The next three sections are devoted to advances in the scientific study of flows in conduits from the work of Leonardo da Vinci until the present day. The progressive scientific evolution of the field is presented in a clear and systematic way, providing interesting context and explanation. I was particularly interested in reading about the work of Manning on channel resistance that he started at the age of 72. This is but one of many interesting stories about the work of the scientists and engineers who have contributed to our

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understanding of flow in conduits. The inclusion of over three dozen photographs of these researchers is a nice touch. Professor Mossa has also made it clear that research on flow in conduits continues to the present day, and that some of the results presented in basic undergraduate textbooks are relatively recent.

Better understanding of flow in conduits did not immediately translate into improved water supplies. Various attempts to improve water supplies in major European cities using river diversions and pumping in the 16th to nineteenth centuries failed in the face of deteriorating water quality. Professor Mossa notes that after 1,500 years: “The correct solution found was to revive the entire technological apparatus of the Roman water supply, but applying new design laws.” Several major modern aqueducts were built at the beginning of the twentieth century.

One of these, the Apulian aqueduct in southern Italy, is described in the final section, along with the daunting engineering and political challenges associated with it. Of four competing proposals, the one by engineer Zampari was chosen by the examining commission, but financial and political challenges preventing the project from proceeding which “meant total ruin for engineer Zampari, who did not survive the collapse of his work to which he had sacrificed his wealth and his efforts.” The account of this tragedy resonated with me. One of the other major aqueducts of the time was the 564 km long Goldfields Water Supply Scheme in Western Australia. The scheme was devised by C. Y. O’Connor who was subject to widespread condemnation from politicians and the press who claimed that the scope of the engineering task was too great and was doomed to failure. O’Connor suicided before the commissioning of the final project. I spent the first years of my life at the seventh of eight pumping stations along the Goldfields Water Supply pipeline where my father worked as a technician. Both the Apulian Aqueduct and the Goldfields Water Supply scheme are still impressive achievements and are still operating successfully.

In conclusion, I thoroughly enjoyed reading this book and learnt a lot from it. Not only do I recommend it to every hydrotechnical engineer, but to anyone who is interested in aqueducts as an integral component of a civil society.

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