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| **Hydraulic Transient Near Wall Effects** |
| **Project Outline**  |
| Hydraulic transients are increasingly being recognised as a key phenomenon that determine lifetimes of our pipeline assets. They have also been demonstrated to play a role in detrimental impacts to water quality, through contaminant intrusion and the mobilisation of materials entrained on pipe walls. This project will explore the critical interactions between the fluid and the pipe walls that drive the behaviour of the hydraulic transients. Using near wall imaging techniques the project will probe the development of velocity profiles during transient events and forces that result. This information will then be used to explore these forces at pipe features such as leaks and junctions and how it impacts transient propagation. The results will also be used to inform existing models of how materials are mobilised from pipe walls and become entrained in the bulk flow.The project is made possible by the recent capital investment in research equipment and instrumentation provided by the UKCRIC facility and takes advantage of the synthesis of this cutting edge technology alongside the world leading expertise in transients at the university. Improving the understanding this critical aspect of hydraulic transients will lead to the development of better modelling tools for the propagation of transients, leak detection and assessing the water quality risks they pose, ultimately allowing better management of water systems, and increasing evidence to support schemes to remove the potentially damaging events from our vital water systems.  |
| **Primary supervisor** |
| Richard Collins, Civil Eng, Theme 3. Expertise in dynamic hydraulics, programming and systems analysisEmail: r.p.collins@sheffield.ac.uk |
| **Other members of the supervisory team** |
| Joby Boxall, Civil Eng, Theme 2 and 3 and Hub. Expertise in hydraulics and potable water supply |
| **How the proposed project adds value to TWENTY65**  |
| An overarching theme of Twenty65 is better knowledge of systems and their performance. This project will unlock some fundamental barriers to our understanding of this. It will also feed into a better understanding of the interactions of water systems and leaks, a key factor in understanding the energy relationships in Theme 2. |
| **Suggest titles and journals for two 4\* papers that you expect to arise from the project** |
| Velocity profiles at pipe line junctions during transient events, experimentation and modellingWall shear during hydraulic transients and its effects on material mobilisation |