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Numerical Relativity 1980-2000s: The era of sharpening our tools and exploring Einstein's physics

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I will review progress made in numerical relativity during the quarter-century from 1980 - 2005 when the tools and techniques of solving the most complex PDEs in mathematical physics—Einstein's equations—developed and matured, taking the field from early proof-of-concept and heroic breakthroughs to essential approaches for exploring general relativity and relativistic astrophysics. Our current ability to solve these equations routinely represents one of the most impressive achievements in all of computational science. I will review key advances in techniques, hardware and software capabilities, and community development, along with important scientific breakthroughs enabled by them. Particularly important developments that helped build both the community and its capabilities include the NSF Black Hole Grand Challenge in the US, the creation of the Albert Einstein Institute in Germany, and the EU Astrophysics Network across Europe. At the same time, the LIGO-VIRGO-GEO detector projects provided important guide stars for this developing field. Collectively, these projects laid the foundation for a community ready to enter the era of multi-messenger astronomy.